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July 25, 2008

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Subject: Project Enhancement and Refinement Document
Carlsbad Energy Center Project (07-AFC-6)

On behalf of the Carlsbad Energy Center LLC, please find enclosed 12 hardcopies and 20 compact discs (CDs) of the Project Enhancement and Refinement Document for the Application for Certification for the Carlsbad Energy Center Project (07-AFC-6). This submittal includes five CDs with air quality and public health modeling files and five CDs with electronic versions of the larger appendices contained in this submittal.

Please call me if you have any questions.

Sincerely,

CH2M HILL

Robert C. Mason
Program Manager

cc: Project File
Proof of Service List

Carlsbad Energy Center Project (07-AFC-6) Project Enhancement and Refinement Document

Submitted by

Carlsbad Energy Center LLC

July 2008

Shaw™ Stone & Webster, Inc.

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Acronyms and Abbreviations

°F	degrees Fahrenheit
AFC	Application for Certification
AHL	Agua Hedionda Lagoon
bbl	barrels
BMP	Best Management Practice
CAISO	California Independent System Operator
CCC	California Coastal Commission
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CEC	Carlsbad Energy Center
CEPC	Carlsbad Energy Center Project
CFR	Code of Federal Regulations
City	City of Carlsbad, California
CPUC	California Public Utility Commission
CSDP	Carlsbad Seawater Desalination Plant
CTG	combustion turbine generator
CWC	California Water Code
DEH	Department of Environmental Health
DMP	Debris Management Plan
EMF	electric and magnetic field
EPS	Encina Power Station
FAA	Federal Aviation Administration
GO	General Order
gpd	gallons per day
gpm	gallons per minute
GSU	generator step-up
HRSG	heat recovery steam generator

Hz	hertz
I-5	Interstate 5
IFS	Interconnection Facilities Study
ISIS	Interconnection System Impact Studies
km	kilometer
kV	kilovolt
LORS	laws, ordinances, regulations, and standards
mgd	million gallons per day
MW	megawatt
NPDES	National Pollutant Discharge Elimination System
PAG	power augmentation
PM_{10}	particulate matter less than 10 micrometers in diameter
ppm	parts per million
ppt	parts per thousand
RUSLE2	Revised Universal Soil Loss Equation
SCB	Southern California Bight
SCE	Southern California Edison
SDAPCD	San Diego Air Pollution Control District
SDG&E	San Diego Gas and Electric
SWPPP	Storm Water Pollution Prevention Plan
TDS	total dissolved solids
TSP	total suspended particulate matter
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
Water Board	California Regional Water Quality Control Board, San Diego Region

SECTION 1.0

Introduction

The Carlsbad Energy Center LLC (Applicant) has identified four enhancements and refinements for the Carlsbad Energy Center Project (CECP), 07-AFC-6, that resolve remaining issues and allow the final aspects of the California Energy Commission (CEC) staff evaluation and analysis to proceed. These project enhancements and refinements address issues raised in various ways, including data requests from CEC staff and resulting data responses previously submitted by the Applicant (Data Responses Set 1, Set 2, and Set 2A) and comments or input provided by the City of Carlsbad (City). Because of the beneficial and issue-resolving character of these enhancements and refinements, the Applicant hereby incorporates these four project enhancements and refinements into the project description for CECP.

The four project enhancements and refinements include:

- **Increase in Stack Height**: Resolution of source testing issues by raising the height of the two stacks to 139 feet. The increase in stack height is in response to issues raised by CEC staff and the staff of the San Diego Air Pollution Control District (SDAPCD) related to possible complications during air emission source testing in a 100-foot-tall stack. By raising the stack height, source test issues are resolved. Visual analysis, as well as the "balloon" demonstration, shows that the increase in height has negligible adverse effect.
- **Ocean-water Purification System and Industrial Wastewater Discharge:** Provision of alternative industrial water supply and industrial wastewater discharge methods to resolve concerns raised by the City that it lacks adequate capacity of reclaimed water. An ocean-water purification system (reverse osmosis) is proposed as an alternative source of industrial water for CECP in addition to the use of California Code of Regulations (CCR) Title 22 reclaimed water. An alternative discharge industrial wastewater path through the existing Encina Power Station (EPS) ocean-water discharge system is offered in addition to the plan to discharge CECP industrial wastewater through the City system. These alternatives resolve any reliability issues related to the City's position that it has insufficient quantities of CCR Title 22 reclaimed water to meet the industrial water requirements for the project, and the City's position that it does not have sufficient capacity for CECP to discharge industrial wastewater to the City's existing sanitary/industrial sewer system. Should the City and the Applicant reach an agreement for the City to provide sufficient quantities of CCR Title 22 reclaimed water and an agreement for the City to accept industrial wastewater in the City's existing sanitary/industrial sewer in time to allow engineering and construction to support the commercial online date for CECP, then the originally proposed water supply and discharge methods will still be able to be used. The Applicant's desire is to have CEC staff address all water and wastewater alternatives in its preliminary and final staff assessments.
- **Tank Demolition and Remediation:** Inclusion of the permitting and environmental analysis of the demolition of fuel oil Tanks 5, 6, and 7 and any resulting soil remediation

after the tank demolition as part of CECP, as requested by the City and CEC staff. The Applicant previously submitted permit applications for demolition of these tanks to the City and the California Coastal Commission (CCC). While the CCC issued a permit for tank demolition, the City has not been willing to issue a demolition permit and has requested that the CEC take jurisdiction for this tank demolition and any resulting soil remediation. Based on this request, the Applicant agrees to have the CEC take jurisdiction for the tank demolition and any resulting soil remediation.

- **New San Diego Gas and Electric (SDG&E) Switchyard:** Movement of the 230-kilovolt (kV) electrical interconnection to east of the railroad tracks, as provided in the Final Interconnection Facilities Study completed by SDG&E. SDG&E proposed to construct a new 230-kV switchyard on property it owns east of the railroad tracks and west of Interstate 5 (I-5). This new 230-kV switchyard is part of SDG&E's system improvement program and will also be the 230-kV point of interconnection for CECP. This enhancement eliminates CECP's connection to and dependency on the use of the existing 230-kV switchyard west of the railroad tracks.

These project enhancements and refinements are described and analyzed in the remaining sections of this document. The analysis that follows focuses on the topical sections of the AFC in which additional information has been provided to discuss the project enhancements and refinements. The AFC and previous data response submittals by the Applicant are refined as appropriate. This information will allow CEC staff to complete its analysis of the CECP.

As appropriate, revised and/or new tables and figures are included in this document. Existing figures and tables that are not affected by these enhancements and refinements are not included in this document. If a figure or table is revised, it is referred to as example as Revised Figure 1.4 (keeping the same number from the AFC or, in some cases, from a data response submittal). New figures and tables are numbered so as to follow in order the figures and tables in the AFC or, in some case, figures and tables from a previous data response submittal by the Applicant (e.g., New Figure 2.2-2A).

1.1 Overview of Project Enhancements and Refinements

The purpose of CECP, project needs and objectives, location, and key facility components of the CECP, as described in Section 1.0 of the AFC, remain the same with the inclusion of the project enhancements and refinements. The increase in stack height and the inclusion of the demolition of Tanks 5, 6, and 7 do not affect the project site boundary or layout. However, the inclusion of the ocean-water purification system includes the construction and operation of new pipelines to CECP from the existing EPS ocean water discharge system. The new alternative industrial wastewater discharge option requires the installation of new pipelines to convey the rejected brine from the ocean-water purification system into the existing EPS ocean-water discharge system. The locations of these new pipelines are shown on Revised Figure 2.1-1 (revised CECP plot plan) and Revised Figure 2.2-1 (revised CECP site plan).

1.1.1 Facility Location

The location of the new SDG&E 230-kV switchyard is shown on Revised Figure 2.2-1. The new SDG&E 230-kV switchyard is located on SDG&E property south of the CECP site on

Assessors Parcel Number 210-010-42. As is the CECP site, this SDG&E parcel is designated as Public Utility in the City's General Plan and Zoning Code. The 230-kV electrical interconnection from CECP to the new SDG&E 230-kV switchyard will be via underground cable and will result in the elimination of the aboveground CECP electrical interconnection and associated transmission tower from CECP to the existing SDG&E 230-kV switchyard, located on the EPS, that are addressed in the AFC.

As requested by the City, Appendix 1A of the CECP AFC provides a list of the parcel numbers and names of landowners within 1 mile of the CECP site rather than the CEC-requested 1,000 feet from the project site. Appendix 1A also provides a list of landowners within 500 feet of the centerline of the linear corridors. The inclusion of the new SDG&E 230-kV switchyard and CECP interconnection to this new switchyard does not require the revision of the parcel number or landowner list.

Revised Figure 1.3-1 shows a photograph of the CECP site prior to construction and a simulation of the CECP with the 139-foot-tall stacks after construction.

1.1.2 Project Schedule

The revised project schedule that includes the four project enhancement and refinement components remains similar to the schedule included in the AFC. However, as shown on Revised Figure 1.4-1a, with the addition of the demolition of Tanks 5, 6, and 7 to the CECP, the construction and commissioning schedule for the CECP is 25 months compared to the 19-month, single-phase construction and commissioning schedule included in the AFC. Please note, at this time the Applicant is considering a single-phase construction and commissioning schedule, while at the time of docketing the AFC, the Applicant addressed and analyzed both a single-phase and phased construction and commissioning schedule. The construction and commissioning schedule is subject to change.

1.1.3 Project Ownership

As noted in the AFC, the CECP (including the underlying parcel) will be owned by Carlsbad Energy Center LLC. The new SDG&E 230-kV switchyard and the underlying parcel on which it is located will be owned and operated by SDG&E. The ocean-water purification system will be owned and operated by the Applicant on a parcel owned by Cabrillo Power I LLC, the legal entity that owns and operates the existing EPS. Both Carlsbad Energy Center LLC and Cabrillo Power I LLC are indirect wholly-owned subsidiaries of NRG Energy LLC.

1.1.4 Project Alternatives

No new project alternatives have been analyzed in this project enhancement and refinements document. The Applicant previously docketed an evaluation of two potential offsite alternatives on sites suggested by the City. As discussed in detail in the CECP Offsite Alternative Analysis, the Applicant found the two sites that were recommended by the City to have significant land use, noise, and visual impacts. These issues render these two sites as non-viable alternatives to the project site. For a complete evaluation of the two offsite alternative sites recommended by the City, please refer to the previously docketed CECP Offsite Alternative Analysis.

Existing View from Encina Power Station turbine building

NOTE: Three of the existing tanks will be demolished as part of ongoing operations and maintenance of the Encina Power Station.

Visual Simulation of Proposed Project

Stack height is shown at 139 feet

REVISED FIGURE 1.3-1
PROJECT SITE APPEARANCE
EXISTING VIEW AND VISUAL SIMULATION

CARLSBAD ENERGY CENTER PROJECT

ENVIRONMENTAL VISION

EY072007001SAC Figure_1.3-1.ai 7/1/2008 afint

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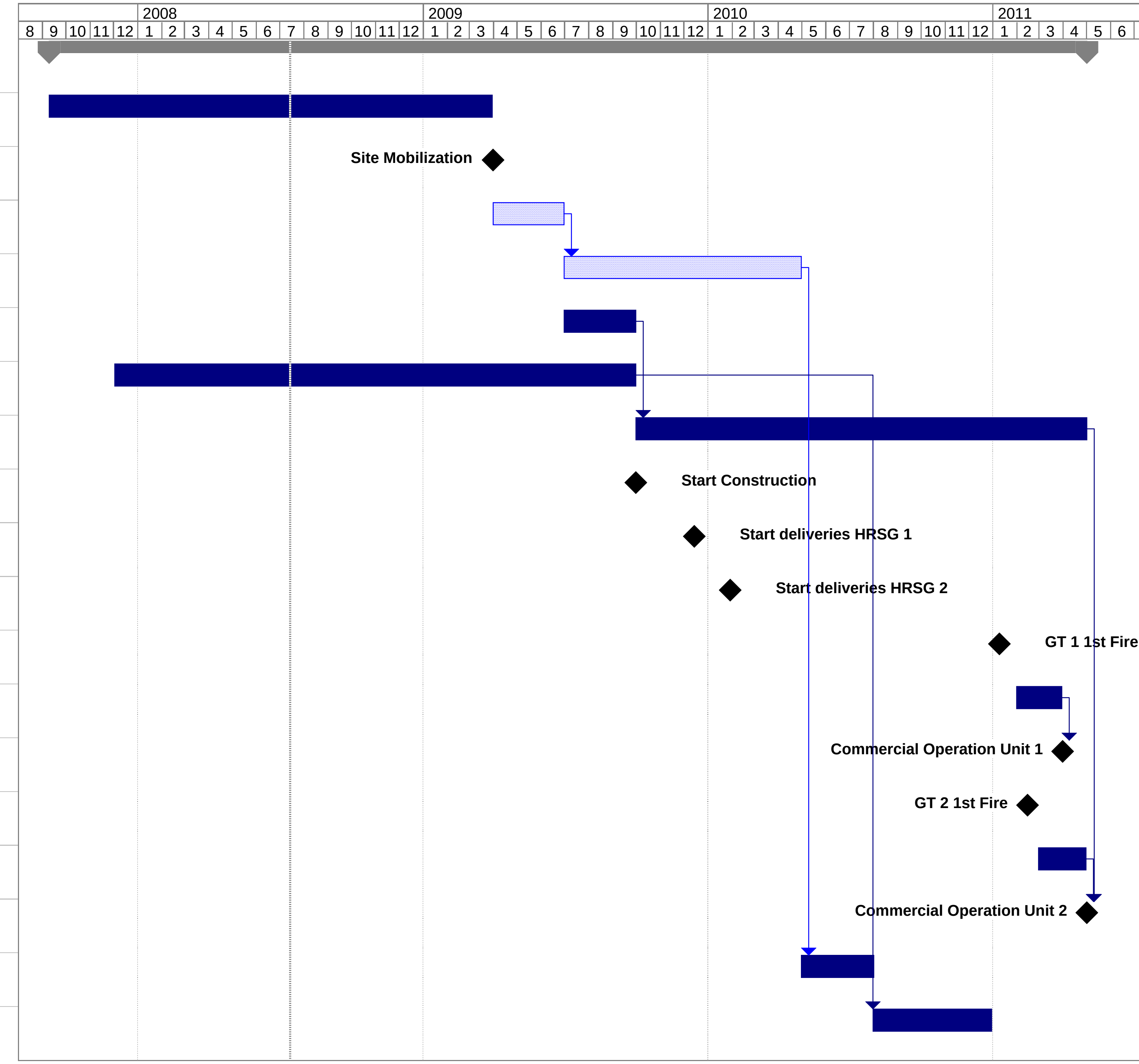
ID	Task Name	Duration	Start	Finish	Predecessors
0	**CECP Schedule**	**1330 days**	**Mon 9/10/07**	**Sun 5/1/11**	
1	**AFC Submittal and Review**	568 days	Mon 9/10/07	Mon 3/30/09	
2	Site Mobilization	0 days	Wed 4/1/09	Wed 4/1/09	
3	Tank Demo/Ocean Water Purification	91 days	Wed 4/1/09	Tue 6/30/09	
4	SDGE 230 kV Switchyard	304 days	Wed 7/1/09	Fri 4/30/10	3
5	**Berm Removal /Site Prep**	92 days	Wed 7/1/09	Wed 9/30/09	
6	**EPC - Engineering**	668 days	Mon 12/3/07	Wed 9/30/09	
7	**EPC - Construction**	578 days	Thu 10/1/09	Sun 5/1/11	5
8	Start Construction	0 days	Thu 10/1/09	Thu 10/1/09	
9	Start deliveries HRSG 1	0 days	Tue 12/15/09	Tue 12/15/09	
10	Start deliveries HRSG 2	0 days	Sat 1/30/10	Sat 1/30/10	
11	GT 1 1st Fire	0 days	Mon 1/10/11	Mon 1/10/11	
12	**Commissioning Unit 1**	58 days	Tue 2/1/11	Wed 3/30/11	
13	Commercial Operation Unit 1	0 days	Fri 4/1/11	Fri 4/1/11	12
14	GT 2 1st Fire	0 days	Tue 2/15/11	Tue 2/15/11	
15	**Commissioning Unit 2**	61 days	Tue 3/1/11	Sat 4/30/11	
16	Commercial Operation Unit 2	0 days	Sun 5/1/11	Sun 5/1/11	15,7
17	**Transmission & Distribution Engineering**	93 days	Sat 5/1/10	Sun 8/1/10	4
18	**Transmission & Distribution**	152 days	Sun 8/1/10	Thu 12/30/10	6



Source: Shaw Stone & Webster, Inc., 2008

REVISED FIGURE 1.4a
PROJECT SCHEDULE
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

CH2MHILL

EY072007001SAC Figure_1.4a.ai 7/14/2008 tdaus

Description of Components of Project Enhancements and Refinements

2.1 Introduction

The Applicant has identified the four enhancements and refinements for the project that resolve the remaining issues raised by CEC staff and the City. The Applicant hereby incorporates the four project enhancements and refinements into the project description for CECP. The four project enhancements and refinements are discussed in detail in Section 2.3.1 through 2.3.4.

- **Increase in Stack Height**: Resolution of source testing issues by raising the height of the two stacks to 139 feet. The increase in stack height is in response to issues raised by CEC staff and the staff of the SDAPCD related to possible complications during air emission source testing in a 100-foot-tall stack. By raising the stack height, source test issues will be resolved.
- **Ocean-water Purification System and Industrial Wastewater Discharge**: An ocean-water purification system (reverse osmosis) will provide an alternative source of industrial water for CECP in addition to the use of CCR Title 22 reclaimed water. An alternative industrial waste water discharge path through the existing EPS ocean-water discharge system is offered in addition to the plan to discharge plant industrial wastewater through the City system. This alternative industrial water source and discharge path resolve issues related to the City's position that it has insufficient quantities of CCR Title 22 reclaimed water to meet the industrial water requirements for the project and the City's position that it does not have sufficient capacity for the project to discharge wastewater to the City's existing sanitary/industrial sewer system.
- **Tank Demolition and Remediation**: Inclusion of the demolition of fuel-oil Tanks 5, 6, and 7 and any resulting soil remediation after tank demolition as part of the project, as requested by the City and CEC staff. The Applicant previously submitted permit applications for demolition of these tanks to the City and the CCC. While the CCC issued a permit for tank demolition, the City requested that CEC take jurisdiction for this tank demolition and any resulting soil remediation. Based on this request, the Applicant agrees to have the CEC take jurisdiction for the tank demolition and any resulting soil remediation.
- **New SDG&E 230-kV Switchyard**: This enhancement involves movement of the 230-kV electrical interconnection to east of the railroad tracks, as provided in the Final Interconnection Facilities Study completed by SDG&E. SDG&E proposes to construct a new 230-kV switchyard on property it owns east of the railroad tracks and west of I-5. This new 230-kV switchyard is part of SDG&E's system improvement program and will become the 230-kV point of interconnection for CECP, thus eliminating CECP's connection to the existing SDG&E 230-kV switchyard west of the railroad tracks when the new 230-kV switchyard is completed by SDG&E.

2.2 Project Design and Generating Facility

These four project enhancements and refinements do not change the overall design and operations of the components of the CECP power block from that described in Section 2.0 of the AFC. Revised Figure 2.1-1 provides the revised plot plan for the project, and Revised Figure 2.2-1 provides the revised site plan for the project. Revised Figure 2.2-2 and New Figure 2.2-2A provide the revised typical elevation for the CECP generating facility and the typical elevation of the new SDG&E 230-kV switchyard, respectively. New Figures 2.2-2B and 2.2-2C provide cross-sections of elevations for the CECP generating facilities and for the new SDG&E 230-kV switchyard, respectively.

The process description for CECP's two power blocks does not change as a result of the project enhancements and refinements. For a complete description of the design, process, and operations of the CECP two power blocks, refer to Section 2.0 of the AFC.

2.3 Project Enhancements and Refinements

The following subsections provide the refinements to the CECP project description based on the four components of the project enhancements and refinements.

2.3.1 Increased Stack Height

The increase in the CECP stack height from 100 to 139 feet is primarily to resolve an issue initially raised by the CEC staff in Data Request Set Number 1 (i.e., Data Request Numbers 22, 23, and 24) regarding possible complications during air emission compliance tests due to the proposed 100-foot stack height. As discussed in Data Response 118 (Data Response Set 2A), the increase in stack height to 139 feet provides a greater distance between major exhaust flow disturbances and compliance test sample ports. With a stack height of 139 feet, the requirements of United States Environmental Protection Agency (USEPA) Method 1 for two-stack diameters downstream and one-half-stack diameter upstream of flow disturbances are met (40 Code of Federal Regulations [CFR] 60, Appendix A, Method 1, Section 1.2).

The increase in stack height does not alter the air emission control and monitoring for the CECP, as described in Section 2.2.11 of the AFC. Air emissions from the combustion of natural gas in the combustion turbine generators (CTGs) and the recovery of heat through the heat recovery steam generators (HRSGs) include state-of-the-art air emission control systems.

In a letter dated July 11, 2008 and docketed with the CEC, the City of Carlsbad indicated that it is the City's understanding that power plant stack heights are "standard" and notes that from a review of other CEC proceedings that the Siemens units proposed for the CECP have a stack height of 150 feet in two cases and 210 feet in a third case. First and foremost, there is no "standard" height for power plant stacks in general. Specifically, while Siemens may have a typical stack height, each project is different and it is the specific parameters of a project that determines an appropriate stack height. Stack height is not solely determined by the type of generator or HRSG to which the stack is connected. Stack height is driven by air emission and engineering requirements. As has been accomplished for the CECP, the associated modeling for a project determines the stack height so that air emission ground-level concentrations meet applicable air emission permitting rules and regulations. Further, as in CECP, stack height can also be affected by air emission testing and sampling location requirements. Finally, the concept of a “standard” stack height does not exist in countries with advanced health and safety laws and regulations.

2.3.2 Ocean-water Purification System and Industrial Waste Water Discharge

As discussed in Section 1.0 of this document, the ocean-water purification system provides an alternative industrial water supply to resolve objections raised by the City that it lacks adequate capacity of CCR Title 22 reclaimed water. Further, an alternative discharge industrial wastewater path through the existing EPS ocean-water discharge system is offered as an alternative to the plan to discharge CECP industrial wastewater through the City system. These alternate solutions resolve any reliability issues related to the City’s position that it has insufficient quantities of CCR Title 22 reclaimed water to meet the industrial water requirements for the project and that it does not have sufficient capacity for CECP to discharge industrial wastewater to the City’s existing sanitary/industrial sewer system. Should the City and the Applicant reach an agreement for the City to assure sufficient quantities of CCR Title 22 reclaimed water and an agreement for the City to accept industrial wastewater in the City’s existing sanitary/industrial sewer in time to allow engineering and construction to support the commercial online date for CECP, then the originally proposed water supply and discharge methods will be used.

The ocean-water purification system will use reverse osmosis and ion exchange to produce the high-purity industrial water required for the power plant’s HRSGs and other process uses. The purification of ocean water will provide a reliable supply of source water to be used at CECP facility, as well as demineralization of this source water to produce the high-purity industrial water required for CECP processes, including evaporative cooling water, miscellaneous plant uses (e.g., equipment wash water), and possibly onsite landscaping irrigation. Revised Figure 2.2-6a and Revised Figure 2.2-6b provide the schematics of the ocean-water purification and demineralization processes.

The intake for the ocean-water purification system will be from the existing EPS’s once-through cooling water discharge channel, upstream of any process wastewater discharge into the EPS’s discharge channel. Maximum daily intake of ocean water for purification purposes would range between 604,500 gallons per day (gpd) without power augmentation (PAG) and 1.22 million gallons per day (mgd) with PAG operating 8 hours per day, plus additional ocean water for mixing at the outfall for a maximum of 4.32 mgd.

The ocean-water purification system will consist of an ultrafiltration system installed upstream of the first-stage reverse osmosis system, with a storage tank to permit continuous operation regardless of the power plant’s operating mode. The demineralization of the purified ocean water will be essentially the same process proposed in the AFC for the demineralization of the City’s reclaimed water. The first-stage reverse osmosis-treated ocean water will pass through a second-stage reverse osmosis system. The second-stage reverse osmosis permeate will be further demineralized by treatment using ion exchange to produce purified industrial water suitable for injection to the HRSGs.

There will be no onsite preparation, regeneration, or disposal of the CECP's ion exchange system's spent resin. The ion exchange system will use a completely contained mobile modular demineralization system provided and maintained by a third-party vendor. The vendor will deliver the mobile demineralizer unit to the site, set the enclosed trailer in place, and connect the demineralization system to the second-stage reverse osmosis treatment units permeate. The process will use one demineralizer trailer to produce 200 gallons per minute (gpm) of high-purity industrial water (<0.05 parts per million [ppm] total dissolved solids [TDS]) starting with ocean water that contain approximately 33,000 ppm TDS. Once the resin system has become spent, the vendor will remove the spent resin unit for regeneration offsite and will replace the spent system with a fresh, regenerated resin trailer.

The ocean-water purification system will generate waste streams associated with the ultrafiltration and first-stage reverse osmosis reject processes. These wastes are described below and presented in New Table 2.1 and New Table 2.2.

2.3.2.1 Ultrafiltration

Ultrafiltration will produce an aqueous waste stream that contains high concentrations of suspended and settled solids. The concentrated waste stream will be further treated onsite using a dewatering process that recycles liquids back to the ocean-water storage tank and produces a filtered solids cake that will be suitable for disposal as a solid waste at a Class III or Class II landfill. The estimated quantity of wastes generated is shown in New Table 2.1 and is based on an assumed worst-case scenario of 30 ppm total suspended solids for the ultrafiltration influent.

NEW TABLE 2.1
Ultra Filtration Wastes

Operating Condition[a]	Concentrated Solids Wastes[b]	Filtered Solids Cake[c]	
With PAG	48 gpm	Dry	300 lbs/day
		Wet[d]	600 lbs/day
Without PAG	30 gpm	Dry	150 lbs/day
		Wet[d]	300 lbs/day

Notes:

[a] Refer to water balances.

[b] Aqueous wastestream from ultrafiltration process.

[c] Solid wastestream from dewatering waste treatment process.

[d] Assumes up to 50 percent moisture content, the maximum moisture content permitted for disposal as a solid waste to a Class III or II landfill.

2.3.2.2 First-stage Reverse Osmosis

The first-stage reverse osmosis process will generate an aqueous waste stream with high concentrations of dissolved solids (i.e., brine or reverse osmosis reject). As previously discussed, the CECP ocean-water purification system would draw source water from the existing EPS once-through cooling water discharge channel. The source water intake flow for the CECP power plant will be 3,000 gpm and assumes a maximum 24-hour, 7-day operating schedule. The concentration factor of the first-stage reverse osmosis brine is estimated to be 1.679. Based on an average ambient ocean salinity of 33.52 ppt[1], the salinity of the first-stage reverse osmosis brine is estimated to average 56.29 ppt. The first-stage reverse osmosis brine will be further diluted by mixing the reverse osmosis reject waste stream with residual source water from the 3,000-gpm intake flow prior to being discharged back to the EPS cooling water discharge channel.

Based on 3,000-gpm intake flow, the estimated volume and salinity concentrations of CECP first-stage reverse osmosis reject waste stream are show in New Table 2.2.

NEW TABLE 2.2
CECP First Stage Reverse Osmosis Reject Waste Stream

First-Stage Reverse Osmosis Reject Properties[a]	Operating Condition	
	With PAG	**Without PAG**
Ocean-water purification system draw from source water intake of 3,000 gpm	848 gpm	420 gpm
Residual source water for dilution prior to discharge to EPS discharge channel	2,152 gpm	2,580 gpm
Reverse osmosis reject volume	505 gpm	275 gpm
Dilution factor from mixing reverse osmosis reject with residual source water[b]	4.26:1	9.38:1
Reverse osmosis reject salinity prior to dilution[c]	56.29 ppt	56.29 ppt
Reverse osmosis reject salinity after dilution and at the point of discharge into the EPS discharge channel	37.84 ppt	35.71 ppt
CECP combined discharge to EPS cooling water discharge channel	2,657 gpm	2,855 gpm

Notes:

[a] Refer to the water balances.

[b] Dilution Factor = residual source water volume: reverse osmosis reject volume.

[c] Assumes intake ocean water with and average salinity of 33.5 ppt and a concentration factor of 1.679.

2.3.3 Tank Demolition and Remediation

Pertinent information related to the demolition of Tanks 5, 6, and 7 as part of the project enhancements and refinements is included in the August 2007 Phase I environmental site assessment described in Section 5.14 of the AFC 14 and included as an appendix to the AFC, and a Phase II environmental site assessment performed by Fluor Daniel GTI for SDG&E before Cabrillo Power I LLC took ownership of portions of the EPS. This Phase II environmental site assessment was submitted in response to CEC Data Request 73. In addition, as part of the response to Data Request 73, the *Report on Soil Remediation, Encina Power Plant,* which described previous soil remediation within the tank farm where the CECP will be located, was submitted to the CEC.

Cabrillo Power I LLC submitted a voluntary remediation application to Department of Environmental Health (DEH) on November 27, 2007 for investigation and remediation of impacted soils if impacted soils were found to be present within the tank farm following demolition of the Tanks 5, 6, and 7. Initially, demolition of Tanks 5, 6, and 7 was not included as part of the CECP. It was expected that the tank demolition would be conducted under permits from the City and the CCC as part of an action that would have been separate

[1] The mean seawater salinity between 1980 through 2000 as reported by the EPS.

from the processing and licensing of the CECP by the CEC. Cabrillo Power I LLC previously submitted tank demolition permit applications to the City of Carlsbad and the CCC. While CCC issued the requested demolition permit, the City of Carlsbad did not and instead requested that CEC take jurisdiction for tank demolition as part of the CEC licenses for CECP. When issued, the CEC license will authorize tank demolition, but DEH will retain jurisdiction for approval and implementation of the work plan for soil remediation. A copy of the *Carlsbad Energy Center Project - Fuel Oil Storage Tank Removal and Verification Sampling Work Plan Encina Power Station, Carlsbad, California, Voluntary Assistance Program Case Number H13941-004* is included as New Appendix 2.H. This work plan addresses soil removal and verification sampling and has been submitted to the DEH for review and approval. A work plan for the physical removal of the associated piping, foundations, and structures will also be prepared for DEH Hazardous Materials Division review, as well as CEC review. A copy will be provided to the CEC when available.

2.3.3.1 History of Storage Tank Service

The East Tank Farm area is located in the northeastern portion of EPS property. This tank farm includes four No. 6 fuel-oil aboveground storage tanks (Tanks 4, 5, 6, and 7, as shown on New Figure 2.3-1). As part of the CECP, Tanks 5, 6, and 7 will be demolished, and soil remediation will be implemented after demolition. Tank 4 will continue to remain in service since it provides backup fuel oil for EPS Unit 4.

Tanks 4, 5, 6, and 7 were constructed in the 1970s to store No. 6 fuel oil used for electric power generation. Until 1984, the EPS was primarily fueled by Bunker C or No. 6 fuel oil. Since 1984, the EPS has been the primarily fueled by natural gas. Diesel oil is also present onsite and is used for displacing the residual oil in pipelines (to prevent the residual oil from hardening in pipelines and valves as it cools) and as secondary fuel for the small peaking combustion turbine generator at the EPS.

When required, No. 6 fuel oil for the EPS is delivered from tankers that moor at an existing marine terminal directly offshore in the Pacific Ocean. A 20-inch submerged pipeline is used to transfer the fuel oil from the tankers to any of the tanks.

2.3.3.2 Description of Storage Tanks 5, 6, and 7 and Ancillary Equipment

Tanks 5, 6, and 7 are located within impoundment basins and separated by concrete-coated earthen berms, as shown in New Figure 2.3-1. The top of the berms are at an elevation of approximately 54 feet above mean sea level. The berms are constructed at a 1.5 to 1 slope and are approximately 20 to 25 feet high from the bottom of the East Tank Farm impoundment. At the bottom of the each impoundment basin, the footprint of each tank is surrounded by a 6-inch layer of gravel. Dike drain sump structures, inlets, and 18-inch-diameter corrugated metal drainage pipes line the perimeter of each impoundment basin. A drain rock layer, 4-inches thick, overlays the bottom 15 feet of the slopes of the earthen berms. The slopes of the earthen berms and drain rock layer are covered with a 2-inch-thick layer of gunite, reinforced with 6 by 6 – 10/10 welded wire fabric. The top of each berm varies in width from 10 feet to 16 feet and is covered with 6 to 9 inches of compacted, crushed stone and topped with 3 inches of asphalt pavement.

Conveyance piping to the tanks primarily is aboveground but is directed through the berms. The conveyance piping systems and other appurtenances include:

- No. 6 fuel-oil fill line system.
- No. 6 fuel-oil supply system to Boilers 4 and 5 and associated piping.
- Saturated steam system.
- Electrical systems including instrumentation and controls.
- South Control House equipment.
- North Control House equipment.
- Service/control air systems.
- City water system.
- Fire protection (foam) system.
- Secondary containment sump pump systems.

Design drawings depict the tanks constructed on top of a 6-inch-thick, oil-impregnated sand cushion that is surrounded by a concrete perimeter ring wall. The oil-impregnated sand cushion comprises No. 2 fuel oil thoroughly mixed with sand at a rate of 22 gallons of No. 2 fuel oil per cubic yard of sand. Construction materials and connections for each tank are depicted in the design drawings provided by the Applicant. General information about each tank, based on the design drawings provided by the Applicant, is provided in the following subsections.

Tank 5. No. 6 fuel oil storage Tank 5 was constructed with a pontoon floating roof and holds a nominal net capacity of 250,000 barrels (bbl) or 10,500,000 gallons. The tank has a 240-foot diameter and a 32-foot height, with a minimum roof height of 4.6 feet. Tank 5 is reported to contain approximately 3 feet of waxy residual No. 6 fuel oil, which has a pour point of 120 degrees Fahrenheit (°F). This residual amount equals approximately 19,000 bbl or 798,000 gallons of No. 6 fuel oil. In addition, there are approximately 2 feet of water and/or oily water reportedly contained in Tank 5 due to rain penetrating through the floating roof.

Tank 6. No. 6 fuel oil storage Tank 6 was constructed with a double-deck floating roof and holds a nominal net capacity of 445,000 bbl or 18,690,000 gallons. The tank has a 315-foot diameter and a 32-foot height, with a minimum roof height of 5.5 feet. Tank 6 is reported to contain approximately 1 foot of waxy residual No. 6 fuel oil, which has a pour point of 120°F. This residual amount equals approximately 11,000 bbl or 462,000 gallons of No. 6 fuel oil. There is no reported water and/or oily water on top of the residual No. 6 fuel oil.

Tank 7. No. 6 fuel oil storage Tank 7 was constructed with a double-deck floating roof and holds a nominal net capacity of 450,000 bbl or 18,900,000 gallons. The tank has a 318-foot diameter and a 32-foot height, with a minimum roof height of 6 feet. Tank 7 is reported to contain approximately 2 feet of waxy residual No. 6 fuel oil, which has a pour point of 120°F. This residual amount equals approximately 19,000 bbl or 798,000 gallons of No. 6 fuel oil. There is no reported water and/or oily water on top of the residual No. 6 fuel oil.

2.3.3.3 Removal of Residual Oil – Tanks 5, 6, and 7

Prior to demolition and remediation activities, the remaining residual fuel oil in Tanks 5, 6, and 7, which have formed fairly solidified heels, will be removed. The heel volume is estimated at a total of 49,000 bbl, including solids for all of these tanks.

Although other methods of heel removal are being evaluated, the current plan is to circulate heated oil from Tank 4 to provide direct contact with the solidified heels. In the recirculating process, oil would be cleaned to remove solids and water. The processed oil could then be either blended with onsite Tank 4 (or Tank 2) inventory, both of which remain in service to support current operations of the Encina Power Station, or removed offsite.

2.3.3.4 Preliminary Tank Demolition and Remediation Activities – Tanks 5, 6, and 7

In addition to the tank removal, removal of the cushion soil and any contaminated soil from beneath the tanks will also occur, as well as the removal of the fuel oil remaining in the tanks and associated piping. Activities to be performed include:

- Development of project and attainment of necessary permitting from state and local agencies; however, as noted above, the City of Carlsbad has requested that CEC take jurisdiction for local permits for the demolition of the tanks as part of the CECP licensing process, and CEC has agreed to take jurisdiction.
- As discussed above, the *CECP - Fuel Oil Storage Tank Removal and Verification Sampling Work Plan Encina Power Station, Carlsbad, California, Voluntary Assistance Program Case Number H13941-004* is included as New Appendix 2.H. This work plan addresses soil removal and verification sampling and has been submitted to the DEH for review and approval. A work plan for the physical removal of the tanks will also be prepared for DEH Hazardous Materials Division review and approval, and a copy will be provided to the CEC when available.
- Removal of residual water, No. 6 fuel oil (heel) and any water/No. 6 fuel-oil mixture from within Tanks 5, 6, and 7 and all associated piping for either offsite recycling or disposal or onsite recycling.
- Demolition and removal of Tanks 5, 6, and 7 and the associated conveyance piping and other appurtenances from the East Tank Farm for offsite recycling or disposal, as appropriate.
- Removal of oil-impregnated sand cushion from beneath Tanks 5, 6, and 7 from the footprint of each tank and removal of any associated impacted soil by remedial excavation.
- Environmental oversight for post-excavation soil and groundwater confirmation sampling beneath Tanks 5, 6, and 7 to assess any potential release of contamination.
- Removal of the intermediate berms separating Tanks 5, 6, and 7 to create one level impoundment basin.
- Backfill of all remedial excavations using soil from the intermediate berms and spreading and compaction of all residual soil from the intermediate berms over the former footprint of Tanks 5, 6, and 7.
- Demarcation of fuel oil and associated piping to allow for continued use of Tank 4, which will remain in operation to supply fuel oil to EPS Unit 4.

2.3.4 New SDG&E 230-kV Switchyard

CECP will have two trains of generation, designated as Unit 6 and Unit 7. Each train includes one natural-gas-fired CTG and one HSTG. Each generator will have a generator step-up (GSU) transformer with the high-voltage primary winding connected to a high-voltage circuit breaker.

For Unit 6, the GSU transformer connected to CTG will step up the generation voltage from 16.5 kV to 138 kV, and the GSU transformer connected to STG will step up the generation voltage from 13.8 kV to 138 kV. One hundred thirty-eight kV SF6 circuit breakers will be connected to the high side of the GSU transformers, which will be then tied together and will connect to a new 138-kV transmission line. This 138-kV transmission line, approximately 2,059 feet long, will interconnect Unit 6 to the existing SDG&E 138-kV Encina switchyard.

For Unit 7, the GSU transformer connected to CTG will step up the generation voltage from 16.5 kV to 230 kV, and the GSU transformer connected to STG will step up the generation voltage from 13.8 kV to 230 kV. Two hundred thirty kV SF6 circuit breakers will be connected to the high side of the GSU transformers, which will be then tied together and will connect to a new 230-kV transmission line approximately 1,800 feet long overhead line from Unit 7 up to the CECP south property line. From there, the line will use 230-kV cables in underground duct-bank or grade-level trenches with removable covers to connect to a new SDG&E 230-kV switchyard to be constructed by SDG&E and to be located directly south of SDG&E's Canon substation, all within the adjacent SDG&E-owned property, as shown in Revised Figure 2.2-1.

The 138-kV existing SDG&E Encina switchyards, the proposed Unit 6 and Unit 7 power plants, and the proposed interconnecting 138-kV transmission line are all located within the existing EPS site. The proposed interconnecting 230-kV transmission line from Unit 7 is located partly on the EPS site and partly on the adjoining SDG&E site, where it will terminate in the new SDG&E 230-kV switchyard, as shown in Revised Figures 2.1.1 and 2.2-1.

The transmission line interconnection to the California Independent System Operator (CAISO) grid will be via the existing 138-kV and 230-kV transmission lines from the SDG&E existing Encina 138-kV switchyard and the new SDG&E 230-kV switchyard.

See Section 3.0 for a complete description and analysis of the refined electrical interconnection system for CECP.

2.4 Project Construction

Construction of the CECP which, as part of the project enhancements and refinements, includes demolition and remediation of Tanks 5, 6, and 7 and SDG&E's construction of the new 230-kV switchyard, is expected to begin in the second quarter of 2009, with a commercial online date of summer 2011. The AFC included two optional construction schedules that did not include tank demolition and remediation. The first schedule was a single-phased, 19-month construction schedule with both generating units having a single commercial online date. The second schedule was a phased construction schedule, with one generating unit having a commercial online date in 19 months and the second generating unit having a commercial online date in 25 months.

As part of this project enhancements and refinements, the Applicant proposes a single-phase, 25-month construction schedule, as shown in Revised Figure 1.4-1a. The construction and commissioning schedule is subject to change.

Revised Table 2.2-4A provides the CECP construction workforce by labor craft by month during the single-phase construction schedule. Revised Table 2.2-5B provides the anticipated construction deliveries, both truck deliveries and rail deliveries (heavy and oversized loads), for the single-phase construction schedule.

As discussed in the AFC, typically, heavier construction activities will be scheduled to occur between 7 a.m. and 7 p.m. Additional hours may be necessary to make up schedule deficiencies or to complete critical construction activities (e.g., pouring of concrete at night during hot weather, working around time-critical shutdowns and constraints, etc.). During some construction periods and during startup and commission of the units, some activities will continue 24 hours per day, 7 days per week.

The discussion of construction laydown and construction worker parking areas, and construction truck delivery access to the site remains the same as discussed in Section 2.2.15 of the AFC.

2.5 Generating Facility Operations

The discussion of CECP operations remains the same as discussed in Section 2.2.16 of the AFC.

2.6 Engineering

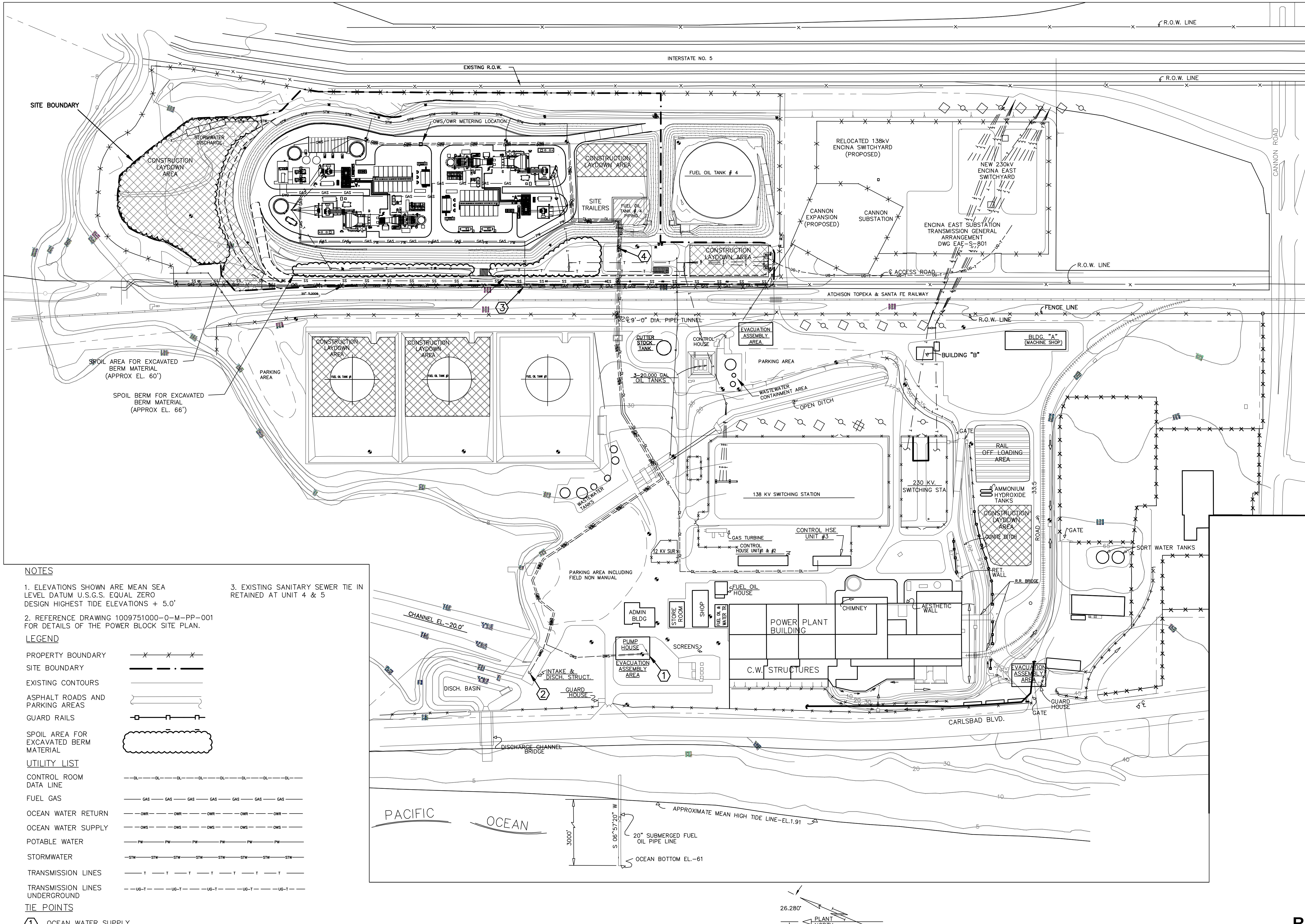
The discussion of CECP engineering and facility remains the same as discussed in Section 2.3 of the AFC, including the engineering appendices for the project.

2.7 Facility Closure

The discussion of temporary and permanent closure for the CECP remains the same as discussed in Section 2.4 of the AFC.

2.8 Law, Ordinances, Regulations, and Standards

The discussion of laws, ordinances, regulations, and standards (LORS) associated with the engineering, design, and construction of the CECP remain the same as discussed in Section 2.5 of the AFC. Local agency contacts, local permits, and permit schedule remain the same as in discussed Sections 2.6 and 2.7 of the AFC.



NOTES

1. ELEVATIONS SHOWN ARE MEAN SEA LEVEL DATUM U.S.G.S. EQUAL ZERO DESIGN HIGHEST TIDE ELEVATIONS + 5.0'

2. REFERENCE DRAWING 1009751000-0-M-PP-001 FOR DETAILS OF THE POWER BLOCK SITE PLAN.

3. EXISTING SANITARY SEWER TIE IN RETAINED AT UNIT 4 & 5

LEGEND

- PROPERTY BOUNDARY
- SITE BOUNDARY
- EXISTING CONTOURS
- ASPHALT ROADS AND PARKING AREAS
- GUARD RAILS
- SPOIL AREA FOR EXCAVATED BERM MATERIAL

UTILITY LIST

- CONTROL ROOM DATA LINE — DL
- FUEL GAS — GAS
- OCEAN WATER RETURN — OWR
- OCEAN WATER SUPPLY — OWS
- POTABLE WATER — PW
- STORMWATER — STW
- TRANSMISSION LINES — T
- TRANSMISSION LINES UNDERGROUND — UG-T

TIE POINTS

1. OCEAN WATER SUPPLY
2. OCEAN WATER RETURN DICHARGE LOCATION
3. FUEL GAS
4. POTABLE WATER

REFERENCE DRAWINGS

1. EXISTING RECLAIM WATER PLAN SOURCE: CARLSBAD MUNICIPAL WATER DISTRICT, CMWD PROJECT NOS. (88-602) AND (92-406) SHEET 3 OF 17.

2. EXISTING CITY (POTABLE) WATER LINE SOURCE: CABRILLO POWER I LLC, PROJECT NO. 13-7292, DRAWING NO. M-661, SHEET 1 OF 1, TRACKING NO. R96B0389.DWG.

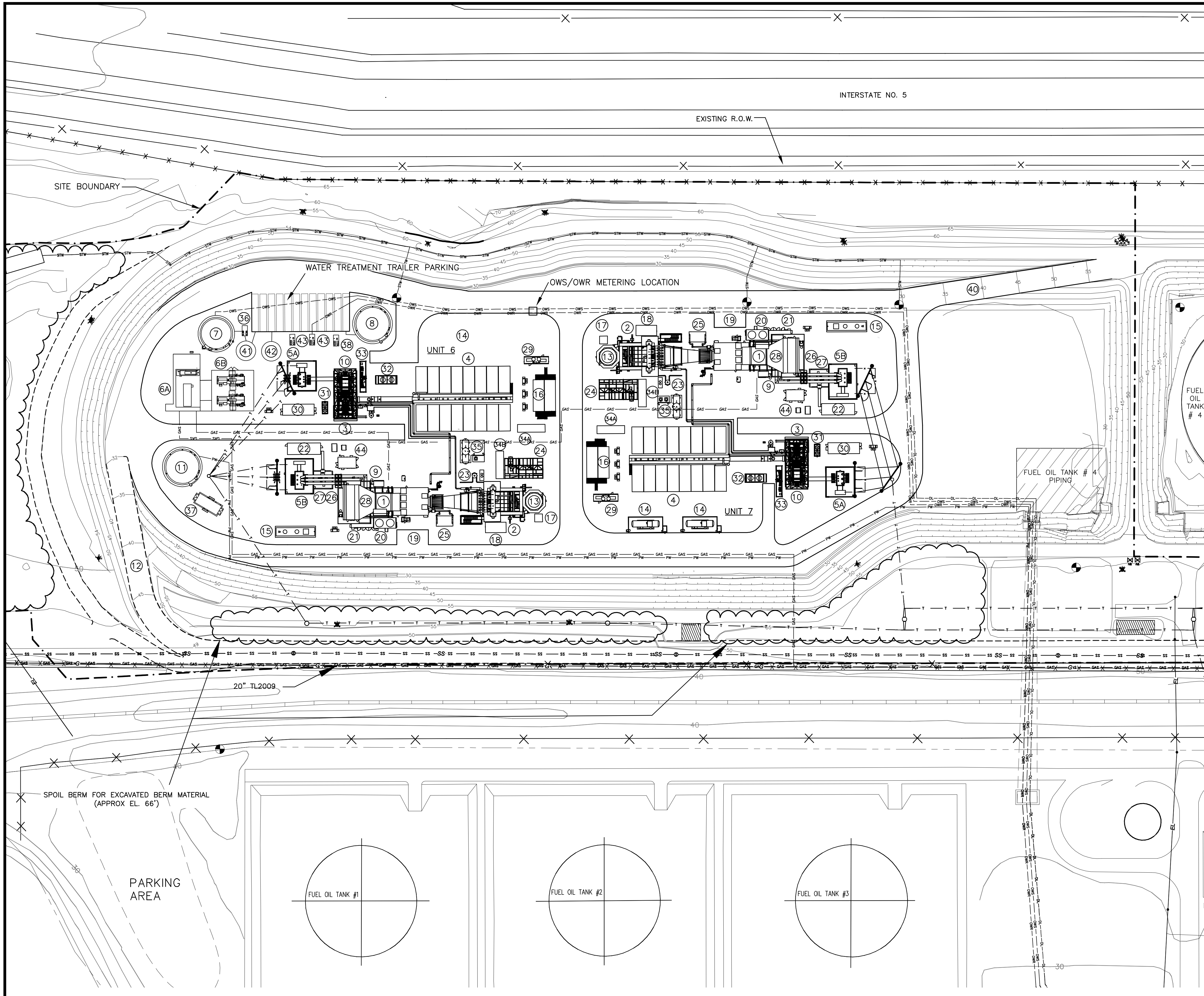
3. ENCINA EAST SUBSTATION TRANSMISSION GENERAL ARRANGEMENT DWG EXE-S-801

Source: Shaw Stone & Webster, Inc.

REVISED FIGURE 2.1-1
CECP PLOT PLAN
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CALIFORNIA

CH2MHILL

EY072007001SAC Figure_2.1-1.ai 07/21/2008 tdaus



NOTES
1. REDRAWN FROM SIEMENS GC75050102 AND GC75060102.
2. REFERENCE DRAWING 1009751000_0_M_PP_005 FOR OVERALL PLOT PLAN.

EQUIPMENT LIST
1 GAS TURBINE ENCLOSURE
2 HEAT RECOVERY STEAM GENERATOR (HRSG)
3 STEAM TURBINE
4 STEAM TURBINE AIR COOLER HEAT EXCHANGER
5A STEAM TURBINE GENERATOR TRANSFORMER
5B COMBUSTION TURBINE GENERATOR TRANSFORMER
6A FUEL GAS CONDITIONING/METERING
6B FUEL GAS COMPRESSORS ENCLOSURE
7 OCEAN WATER / RECLAIM WATER TANK
8 DEMINERALIZED WATER STORAGE TANK
9 GAS TURBINE GENERATOR
10 STEAM TURBINE GENERATOR
11 FIRE WATER TANK
12 HEAVY HAUL ACCESS ROAD
13 STACK
14 AMMONIA STORAGE/ UNLOADING
15 OIL/WATER SEPARATOR
16 BALANCE OF PLANT POWER CONTROL CENTER
17 CONTINUOUS EMISSIONS MONITORING SYSTEM
18 SELECTIVE CATALYTIC REDUCTION SKID
19 CRANE MAINTENANCE PAD
20 LUBE OIL COOLER
21 ELECTRICAL PACKAGE
22 MEDIUM VOLTAGE SWITCHGEAR
23 BOILER BLOWDOWN TANK
24 BOILER FEEDWATER PUMP
25 ROTOR AIR FIN FAN COOLER
26 GENERATOR CIRCUIT BREAKER
27 AUXILIARY TRANSFORMER
28 GAS TURBINE INLET FILTER
29 AIR COMPRESSOR
30 STEAM TURBINE POWER CONTROL CENTER
31 GLAND STEAM CONDENSER
32 STEAM TURBINE LUBE OIL COOLER
33 CONDENSATE POLISHING FIN FAN COOLER
34A CHEMICAL DOSING EQUIPMENT
34B SAMPLE PANEL
35 DEAERATOR/DRAIN TANKS/CONDENSATE PUMPS
36 OCEAN WATER FORWARDING PUMPS
37 FIRE WATER PUMPS ENCLOSURE
38 DEMINERALIZED WATER FORWARDING PUMPS
39 REVERSE OSMOSIS DRAIN
40 SECONDARY ACCESS ROAD
41 UF FILTRATE TANK
42 SERVICE WATER (MIX) TANK
43 WATER TREATMENT PUMPS
44 SEE/SFC PACKAGE TRANSFORMERS

UTILITY LIST
CONTROL ROOM DATA LINE
FUEL GAS
OCEAN WATER RETURN
OCEAN WATER SUPPLY
POTABLE WATER
STORMWATER
TRANSMISSION LINES
TRANSMISSION LINES UNDERGROUND
FIRE PROTECTION HYDRANT
EXISTING STORM WATER DRAIN PUMPS

ELEVATIONS SHOWN ARE MEAN SEA LEVEL
DATUM U.S.G.S. EQUAL ZERO
DESIGN HIGHEST TIDE ELEVATIONS + 5.0'

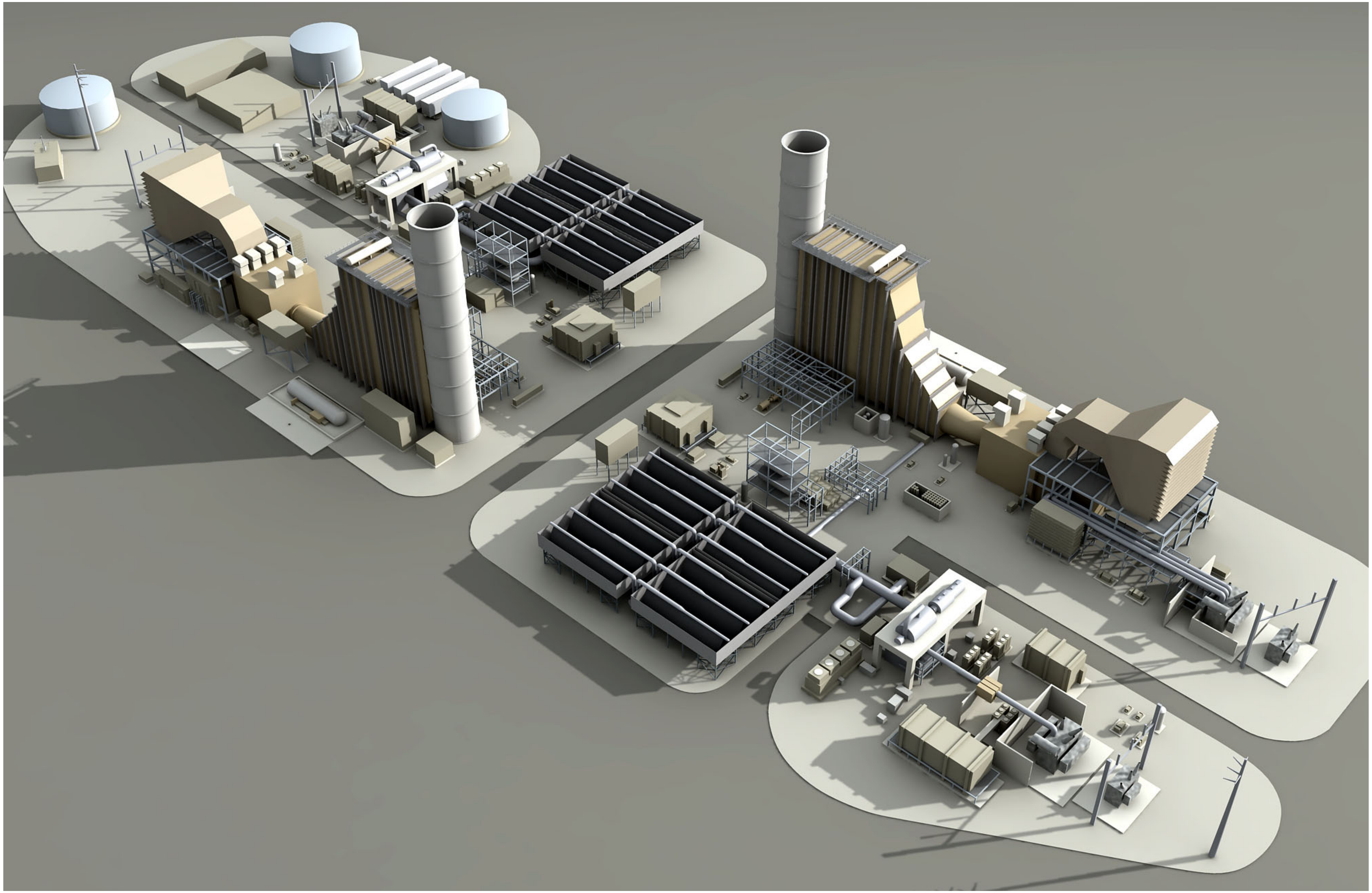
60 30 0 30 60 120 180 240
APPROXIMATE SCALE 1"=60'

Source: Shaw Stone & Webster, Inc.

REVISED FIGURE 2.2-1
CECP SITE PLAN
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CALIFORNIA

CH2MHILL

EY072007001SAC Figure_2.2-1.ai 07/21/2008 tdaus



Note: Stack height is shown at 139 feet.

REVISED FIGURE 2.2-2
TYPICAL FACILITY ELEVATION
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

CH2MHILL

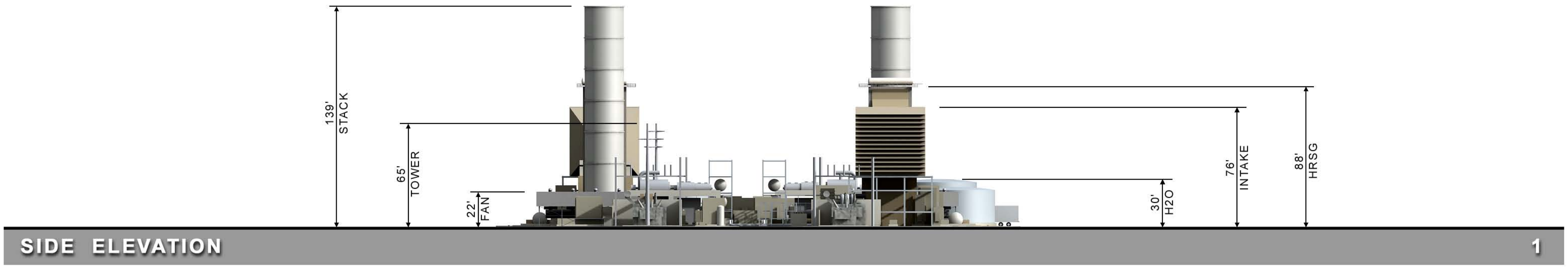
EY072007001SAC Figure_2.2-2.ai 7/21/2008 tdaus

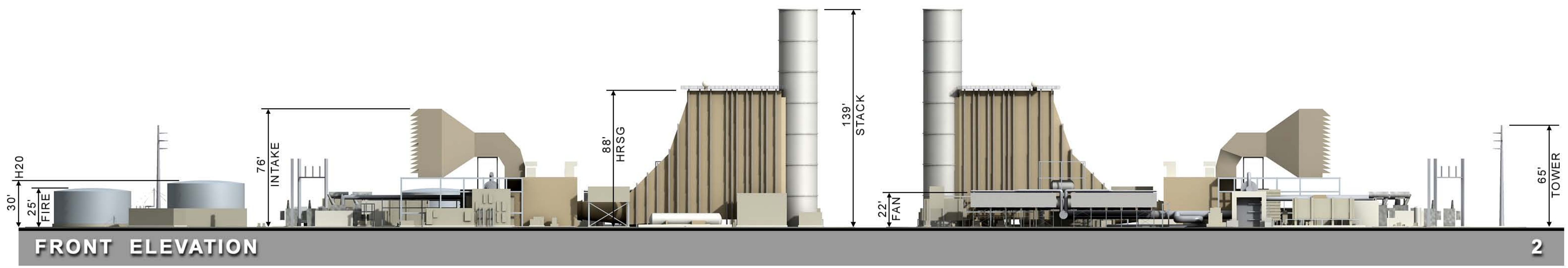
NEW FIGURE 2.2-2A
TYPICAL ELEVATION
SDG&E NEW 230kV SWITCHYARD

CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

CH2MHILL

EY072007001SAC Figure_2.2-2a.AI 7/21/2008 tdaus



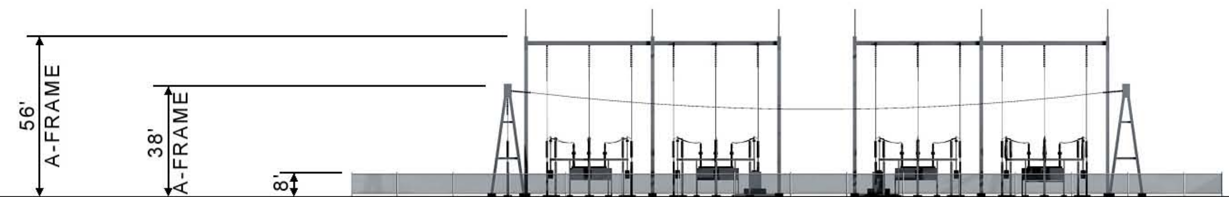


0 50 100 150

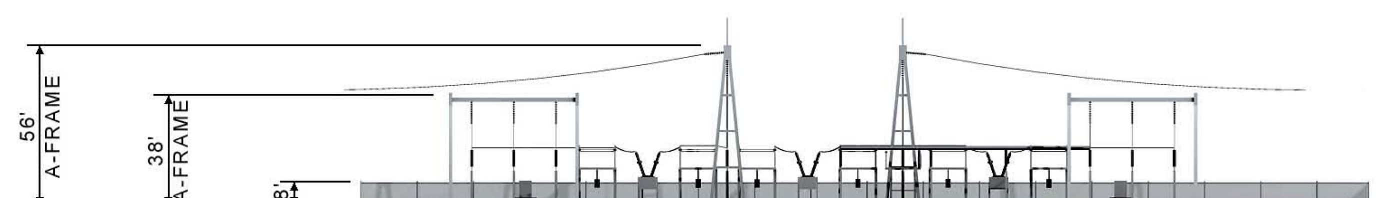
FIGURE 2.2-2B
CROSS-SECTIONS AND ELEVATIONS
CECP POWER BLOCK
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

As noted, stack height is shown at 139 feet.

CH2MHILL



EAST ELEVATION 1



SOUTH ELEVATION 2

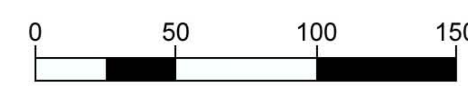
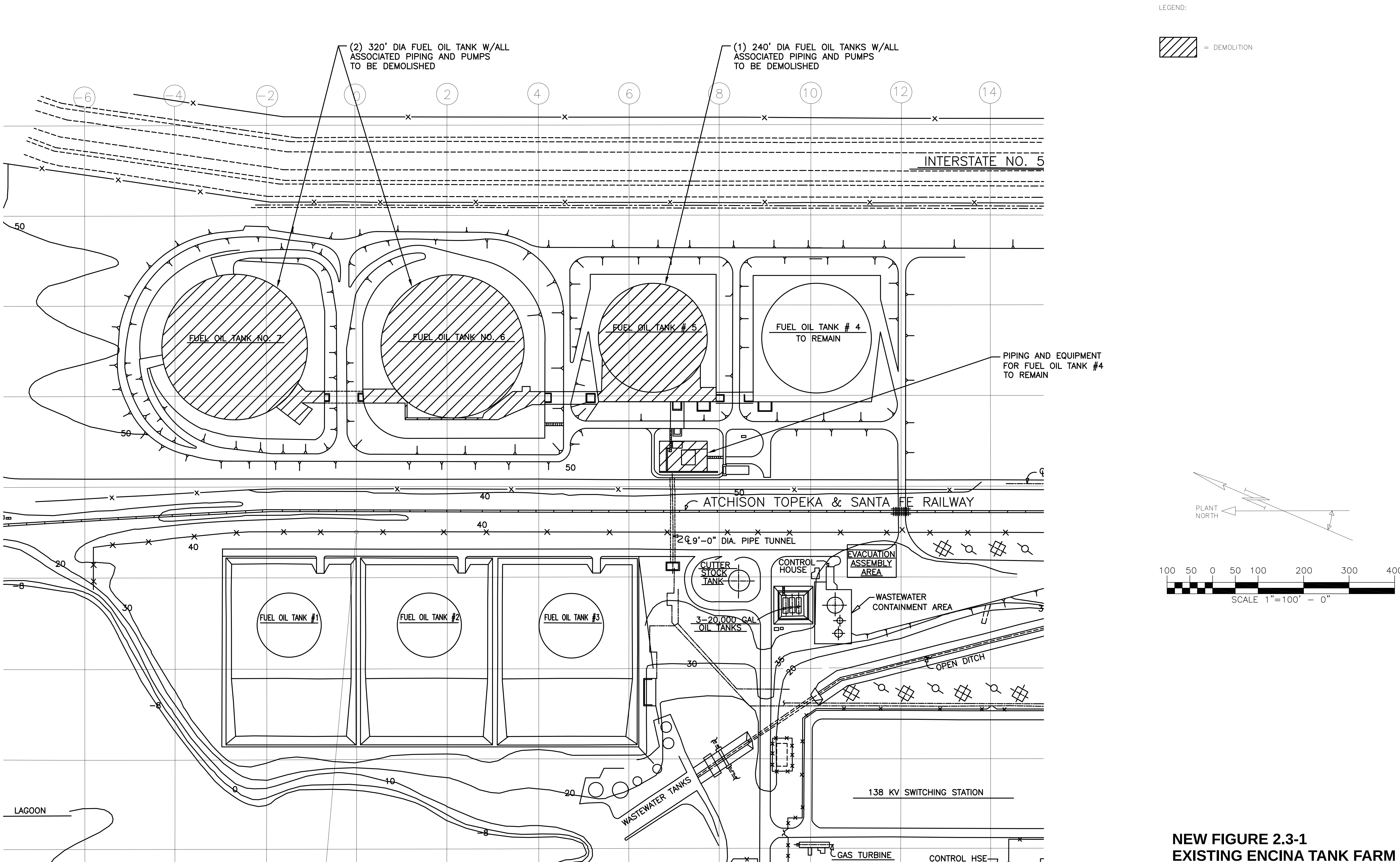


FIGURE 2.2-2C
CROSS-SECTIONS AND ELEVATIONS
NEW SDG&E 230kV SWITCHYARD
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

CH2MHILL



Source: Shaw Stone & Webster, Inc.

NEW FIGURE 2.3-1
EXISTING ENCINA TANK FARM
ENCINA POWER STATION
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CALIFORNIA

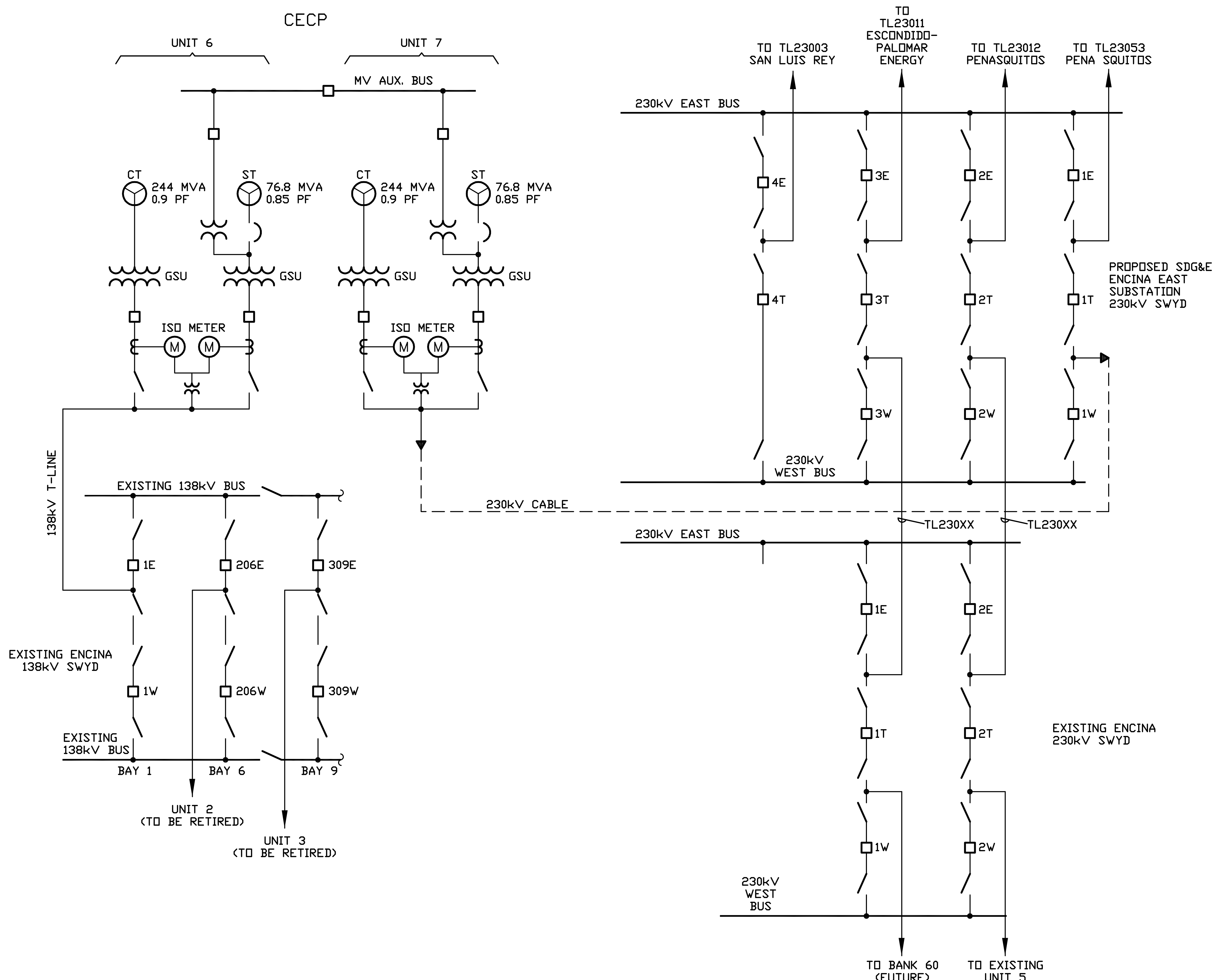
CH2MHILL

EY072007001SAC Figure_2.3-1.ai 07/21/2008 tdaus

REFERENCE DOCUMENTS:

EA230-E-100 ENCINA SUBSTATION, CIRCUIT DIAGRAM & EQUIPMENT LIST, 230KV SUBSTATION

EAE-E-30 ENCINA EAST SUBSTATION, EQUIPMENT ONE LINE DIAGRAM



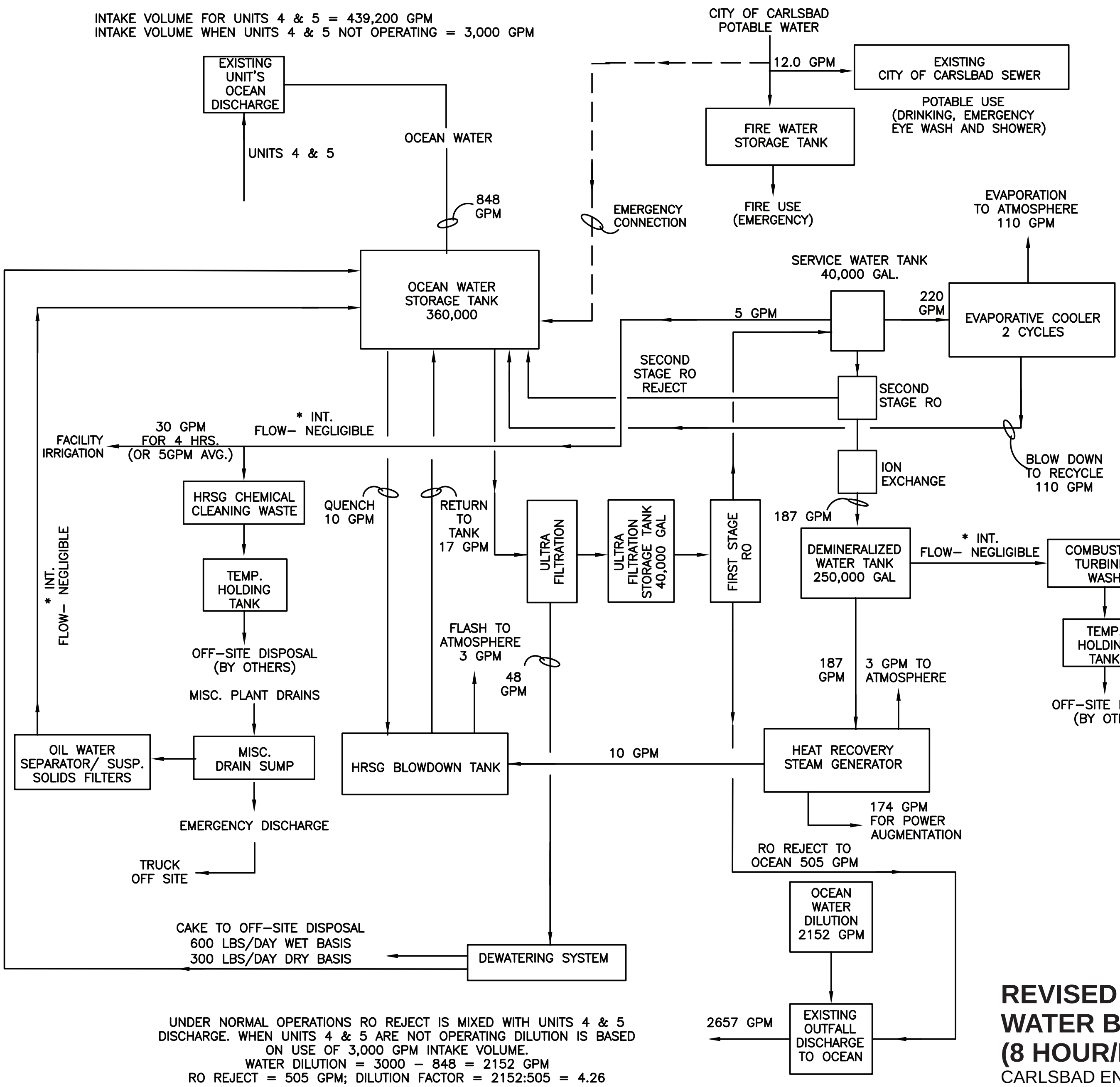
Source: Shaw Stone & Webster, Inc., 2008

REVISED FIGURE 2.2-4
ONE-LINE DIAGRAM
PROPOSED INTERCONNECTION TO SDG&E ENCINA 230kV SWITCHYARD

CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

CH2MHILL

EY072007001SAC Figure_2.2-4.ai 07/21/2008 tdaus



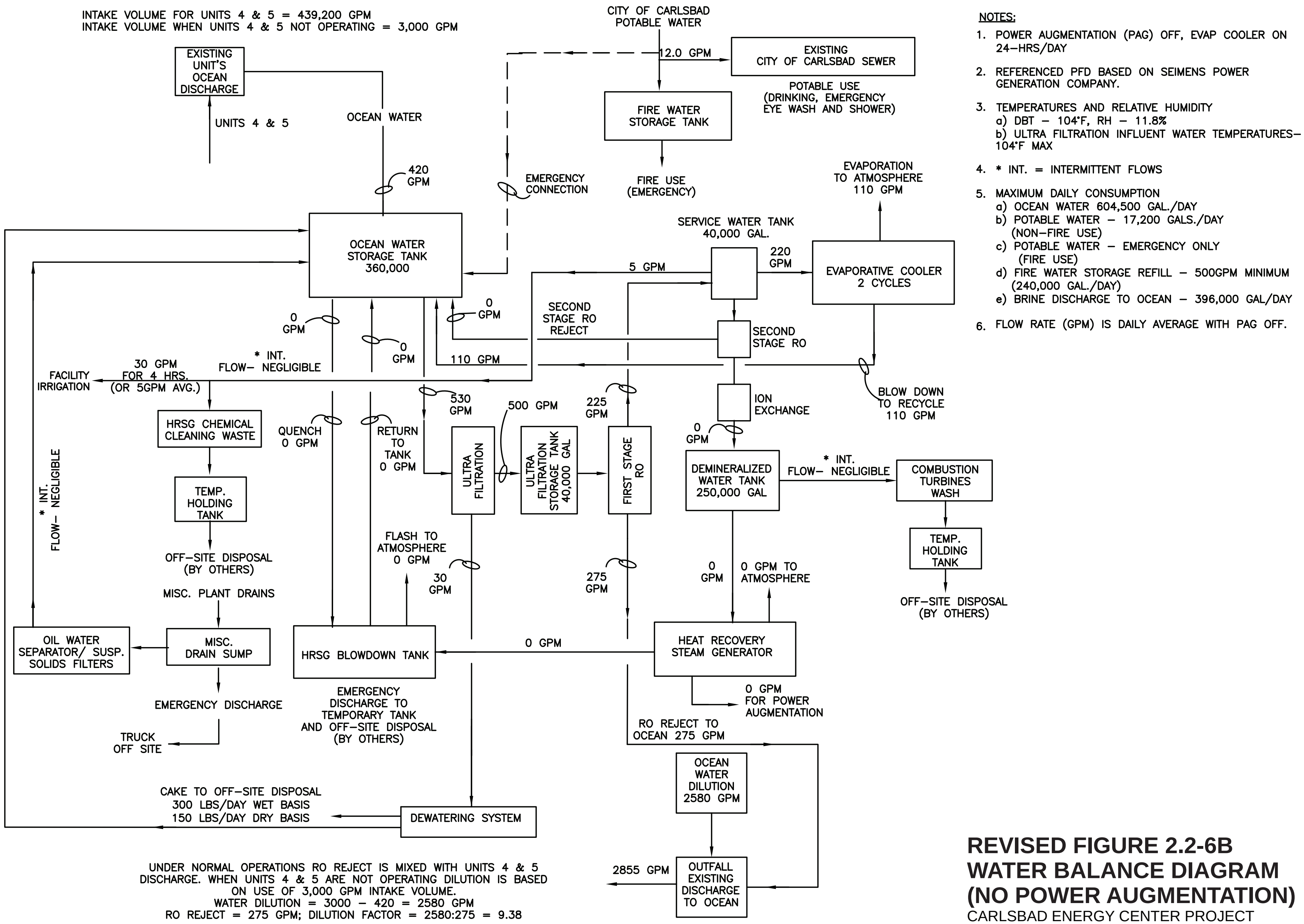
NOTES:

1. POWER AUGMENTATION (PAG) ON 8–HRS/DAY, EVAP COOLER ON 24–HRS/DAY
2. REFERENCED PFD BASED ON SIEMENS POWER GENERATION COMPANY.
3. TEMPERATURES AND RELATIVE HUMIDITY
   a) DBT – 104°F, RH – 11.8%
   b) ULTRA FILTRATION INFLUENT WATER TEMPERATURE– 104°F MAX
4. * INT. = INTERMITTENT FLOWS
5. MAXIMUM DAILY CONSUMPTION
   a) OCEAN WATER 1,221,120 GALS./DAY
   b) POTABLE WATER – 17,200 GALS./DAY (NON–FIRE USE)
   c) POTABLE WATER – EMERGENCY ONLY (FIRE USE)
   d) FIRE WATER STORAGE REFILL – 500GPM MINIMUM (240,000 GAL./DAY)
   e) BRINE DISCHARGE TO OCEAN – 727,200 GAL/DAY
6. FLOW RATE (GPM) IS DAILY MAXIMUM WITH PAG ON.

REVISED FIGURE 2.2-6A
WATER BALANCE DIAGRAM
(8 HOUR/DAY POWER AUGMENTATION)
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CALIFORNIA

CH2MHILL

EY072007001SAC Figure_2.2-6a.ai 07/21/2008 tdaus



REVISED FIGURE 2.2-6B
WATER BALANCE DIAGRAM
(NO POWER AUGMENTATION)
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CALIFORNIA

CH2MHILL

EY072007001SAC Figure_2.2-6b.ai 07/21/2008 tdaus

Transmission System Engineering

3.1 Introduction

Based on the inclusion of a new SDG&E 230-kV switchyard, various refinements in the transmission system engineering for the CECP have been made. Therefore, Section 3.0, Transmission System Engineering, of the AFC has been refined and is included here in its entirety for completeness.

The Applicant will develop the CECP on the existing EPS site. CECP will have two trains of generation, designated as Unit 6 and Unit 7. Each train includes one natural-gas-fired CTG and one HSTG. Each generator will have a GSU transformer with the high-voltage primary winding connected to a high-voltage circuit breaker.

For Unit 6, the GSU transformer connected to CTG will step up the generation voltage from 16.5 kV to 138 kV, and the GSU transformer connected to STG will step up the generation voltage from 13.8 kV to 138 kV. One hundred thirty-eight kV SF6 circuit breakers will be connected to the high side of the GSU transformers, which will be then tied together and will connect to a new 138-kV transmission line. This 138-kV transmission line, approximately 2,059 feet long, will interconnect Unit 6 to the existing SDG&E 138-kV Encina switchyard.

For Unit 7, the GSU transformer connected to CTG will step up the generation voltage from 16.5 kV to 230 kV, and the GSU transformer connected to STG will step up the generation voltage from 13.8 kV to 230 kV. Two hundred thirty kV SF6 circuit breakers will be connected to the high side of the GSU transformers, which will be then tied together and will connect to a new 230-kV transmission line. This 230-kV transmission line, approximately 1,800 feet long, will use overhead line from Unit 7 up to the CECP south property line. From there, the line will use 230-kV cables in underground duct-bank or grade-level trenches, with removable covers to connect to a new SDG&E 230-kV switchyard to be located directly south of SDG&E's Canon substation, all within the adjoining SDG&E-owned property (see Revised Figure 2.2-1).

The 138-kV existing SDG&E Encina switchyards, the proposed Unit 6 and Unit 7 power plants, and the proposed interconnecting 138-kV transmission line are all located within the existing EPS site. The proposed interconnecting 230-kV transmission line from Unit 7 is located partly on the EPS site and partly on the adjoining SDG&E site, where it will terminate in the new SDG&E switchyard, as shown in Revised Figures 2.1.1 and 2.2-1.

The transmission line interconnection to the CAISO grid will be via the existing 138-kV and 230-kV transmission lines from the SDG&E existing Encina 138-kV switchyard and the new SDG&E 230-kV switchyard. The single-line representations of this refined interconnection scheme are depicted in Revised Figures 3.1-1a, 3.1-1b, 3.1-1c, and 3.1-1d. Revised Figures 3.1-1e and 3.1-1f show the pre-project one lines of the existing SDG&E 230-kV and 138-kV Encina switchyards.

This section describes the interconnecting transmission lines and examines its impact on the existing electrical transmission grid. Additional discussions include potential electrical line nuisances (electrical, magnetic, audible noise, corona effects, and safety of the interconnection).

The CECP site was selected, in part, because the existing EPS site is already connected to SDG&E transmission system via the existing 138-kV and 230-kV SDG&E Encina switchyards. As part of the CECP, existing Generation Units 1, 2, and 3, currently connected to the existing 138-kV SDG&E Encina switchyard, will be retired when CECP Unit 6 and Unit 7 are commercially online. Revised Figures 3.1-1g and 3.1-1h show the pre-project one-line and three-line diagrams, respectively, for Encina Generating Units 1, 2, and 3. One of the vacated bus positions (Bay 1) in the existing SDG&E 138-kV Encina switchyard will be used to connect the new 138-kV transmission lines from Unit 6. The 230-kV transmission line from Unit 7 will use overhead line and underground cables that will terminate directly at one of the bays in the new SDG&E 230-kV switchyard using 230-kV cable termination stands.

Figures 3.1-2, 3.1-2, 3.1-3, 3.1-4, and 3.1-5 show the new SDG&E 230-kV switchyard.

Figure 3.1-6 identifies the proposed CECP site layout, including the 138-kV transmission line routing within the existing EPS site and routing of the 230-kV overhead line and underground cable from CECP site to the adjoining SDG&E property south of the Canon Substation. Revised Figure 3.1-7 shows the pre-project general arrangement layout of SDG&E 230-kV and 138-kV existing Encina switchyards. New Figure 3.1-8 shows the post-project general arrangement layout of the new SDG&E 230-kV and existing SDG&E 138-kV Encina switchyards.

Revised Figures 3.1-1i, 3.1-1j, and 3.1-1k show the one-line diagrams of the existing Encina Generating Units 4, 5, and EGT-1.

3.2 Transmission Line Description, Design, and Operation

This section discusses the existing transmission facilities in the vicinity of the CECP, the interconnection to SDG&E system, and the two generator Interconnection System Impact Studies (ISIS) by SDG&E and CAISO. There are two separate ISIS processes, one for interconnection on the 230-kV system and one on the 138-kV system.

3.2.1 Existing Transmission Facilities

The CECP site is located just east of Carlsbad Boulevard in the City of Carlsbad and west of I-5, as shown in Figure 3.1-7. The CECP is located within the site of the existing generation facilities that includes five operational generation units, as shown in Figure 3.1-8.

The existing 138-kV SDG&E switchyard, shown in Figures 3.1-1f and 3.1-9, is connected to:

- Existing Generation Units 1, 2, and 3 (each 107 megawatts [MW], 104 MW, and 110 MW, respectively).
- Existing Generation Unit 4 (306 MW).
- Existing simple cycle combustion turbine generator #EGT-1 (17 MW).

- Station auxiliary transformers and to the startup transformer.
- Four existing 138-kV SDG&E transmission lines (TL 13801, TL 13804, TL 13806, and TL 13807). These transmission lines cross over I-5 heading in an east/southeast direction within SDG&E established transmission corridors that are then connected to SDG&E grid.

The existing 230-kV SDG&E Encina switchyard, shown in Figures 3.1-1e and 3.1-9), is connected to:

- Existing Generation Unit 5 (345 MW).
- Three) existing 230-kV transmission lines (TL 23003, TL 23011, and TL 23012). These transmission lines connect to the grid after crossing over I-5 heading in an east/southeast direction within the existing SDG&E transmission corridors.

3.2.2 Proposed Transmission Interconnection

The CECP is located within the existing EPS site. The new generation will interconnect to the SDG&E transmission system via the existing 138-kV SDG&E Encina switchyard and the new SDG&E 230-kV switchyard south of the Canon substation.

3.2.2.1 Proposed Transmission Interconnection at 230 kV

SDG&E issued a Final Interconnection Facilities Study (IFS) on June 4, 2008, which is provided in New Appendix 3B. In this IFS, the point of interconnection is a new SDG&E 230-kV switchyard to be constructed east of the existing Encina 230-kV switchyard and directly south of SDG&E's 138/12-kV Canon substation. There is no alternative point of interconnection.

The CECP, as shown in Figure 3.1-7 will run approximately 1,800 feet of transmission line, part underground and part overhead, from two 230-kV SF6 circuit breakers and will run disconnect switches of Unit 7 to cable termination stands within one of the bays of the new SDG&E 230-kV switchyard, as shown in Figures 3.2-2 and 3.2-3.

The interconnection facilities required to interconnect the CECP to the SDG&E system at 230 kV are:

- The interconnection facilities for SDG&E consist of a trench, conduit system, and 230-kV underground cables from SDG&E's new switchyard fence line to a new termination stand at one of the bays in the new 230-kV switchyard.
- From the SDG&E 230-kV switchyard fence, CECP will continue the underground 230-kV cable in a trench or underground conduits to a cable termination stand just north of the CECP south property line, where an overhead transmission line will continue and connect to an H-frame at Unit 7.

As part of the reliability network upgrades, SDG&E will:

- Design and construct a 230-kV switchyard on SDG&E property east of the existing Encina 230-kV switchyard and south of the Canon substation.

- Ultimate construction will include four bays in a breaker-and-half arrangement suitable for terminating eight lines.
- Initial construction shall include four bays with overhead terminations for TL23003 (Encina-San Luis Rey), TL23011 (Encina-San Luis Rey-Palomar), TL23012 (Encina-Penasquitos), TL23053 (Encina-Penasquitos #2), existing Encina 230-kV switchyard, and an underground termination for CECP. Figures 3.1-2, 3.1-3, 3.1-4, 3.1-5, and 3.1-6 show the proposed SDG&E 230-kV switchyard.
- Remove unused equipment in the existing 230-kV switchyard located on the EPS.
- Replace three 230-kV tangent steel poles with twin circuit dead-end steel poles.
- Rearrange/install overhead getaways for TL23003, TL23011, TL23012, TL23053, and two lines from the existing Encina switchyard to the new switchyard. This includes installation of approximately 9,200 feet of 1033.5 Kcmil ACSR/AW conductor and the removal of 21,600 feet of 1033.5 Kcmil ACSR/AW conductor.

3.2.2.2 Proposed Transmission Interconnection at 138 kV

The CECP, as shown in Figure 3.1-7 will run approximately 2,059 feet of overhead transmission line (Figures 3.2-4, 3.2-5, and 3.2-2) from the two 138-kV SF6 circuit breakers and will run disconnect switches of Unit 6 to Bay 1 dead-end structure in SDG&E 138-kV existing Encina switchyard, as shown in Figure 3.2-6. CECP will retire the existing Encina Generating Units 1, 2, and 3 when Unit 6 and Unit 7 are commercially online.

The interconnection facilities needed to interconnect the CECP to SDG&E system at 138 kV include:

- In the existing 138-kV SDG&E Encina switchyard, SDG&E will disconnect the existing incoming 138-kV lines from the existing EPS Generating Units 1, 2, and 3 GSU transformers and will perform the bus rearrangements necessary to accommodate the CECP 138-kV transmission line.
- From the last CECP 138-kV transmission line dead-end pole, SDG&E will connect the CECP 138-kV transmission line to the vacated position in Bay 1 at the north end of the 138-kV Encina switchyard, as shown in Figure 3.2-5. This transmission line from Unit 6 will carry less power than the removed generation from the retired Generating Units 1, 2, and 3. Therefore, new generation will not impact the ratings of the existing 138-kV Encina switchyard or the existing 138-kV transmission lines from the Encina switchyard that connect to the grid.

3.2.3 Transmission Interconnection System Impact Studies

SDG&E/CAISO issued the Draft ISIS, dated June 5, 2007. This ISIS considered a net increase of 288 MW of new generation interconnecting to 230-kV SDG&E existing Encina switchyard. SDG&E/CAISO held several meetings with the Applicant afterwards to review the ISIS. SDG&E/CAISO has since decided to build a new 230-kV switchyard east of the existing 230-kV Encina switchyard as per the IFS issued on June 4, 2008, provided as New Appendix 3.B.

SDG&E/CAISO issued the Final IFS for the Encina repower 138-kV system, dated July 7, 2008, which is provided as New Appendix 3.C. The point of interconnection is at SDG&E Encina 138-kV switchyard. The CECP will have a maximum net output of 260 MW from Unit 6 for interconnection to SDG&E 138-kV Encina switchyard. No delivery network upgrades were directly identified for the interconnection of the project. The following reliability upgrades are upgrades to the existing facilities beyond the point of interconnection and are needed to interconnect the CECP to the Encina 138-kV bus:

- Install one 138-kV, 2,000A circuit breaker, two 2,000A disconnects, one bus support stand, and associated 138-kV bus in Bay 1.
- Install associated control and protection panels for the new line position and add remote terminal unit points for the control, monitoring and alarming.
- Relocate TL13801 from Bay 1 to Bay 2.
- Upgrade Bay 2 to 2,000A rating by replacing:
  - Two 138-kV oil breakers with 2,000A gas breakers.
  - Four 1,200A disconnect with 2,000A disconnects.
  - Associated disconnect and bus structures and foundations.
  - All 138-kV bus conductors.
- Upgrade associated control and protection panels for the new line position and add remote terminal unit points for control, monitoring, and alarming.
- Relocate TL13801 drop spans from Bay 1 to Bay 2.

CECP will retire EPS Generating Units 1, 2, and 3 prior to placing CECP Unit 6 and Unit 7 in commercial service. Unit 1 will be retired prior to bringing Unit 6 online. The retirement of EPS Generating Units 2 and 3 will precede commercial operation of CECP Unit 7.

3.3 Transmission System Safety and Nuisances

This section discusses safety and nuisance issues associated with the electrical interconnection of the CECP into the existing electrical grid.

3.3.1 Electrical Clearances

High-voltage overhead transmission lines consist of bare conductors, support structures, polymer or porcelain insulators, and connecting hardware. Transmission lines are designed and constructed so that they provide sufficient clearances to protect the public and the utility workers. Minimum clearances are established by National Electric Safety Code, California Public Utility Commission (CPUC) General Order 95 (GO-95), electric utilities, state regulators, and local ordinances. Typically, clearances are specified for:

- Distance between the energized conductors themselves.
- Distance between the energized conductors and the supporting structure.

- Distance between the energized conductors and other power or communication lines on the same supporting structure.
- Distance from the energized conductors to the ground and features such as roadways, railroads, driveways, parking lots, navigable waterways, airports, etc.
- Distance from the energized conductors to buildings and signs.
- Distance from the energized conductors to other parallel power or communications lines.

The CECP transmission interconnection will be designed to meet all federal, state, and local code clearance requirements. Since the design must consider many different situations, the generalized dimensions provided in the figures of this section should be regarded as conceptual. The location of the McClellan Palomar Airport nearby requires that the height of the transmission line poles be limited, and CPUC GO-95 requires that the minimum clearance for 230-kV transmission line be 30 feet above thoroughfare.

The final design will comply with CPUC GO-95, as well as SDG&E and Southern California Edison (SCE) guidelines for the electric and magnetic field (EMF) reduction.

3.3.2 Electrical Effects

The electrical effects of high-voltage transmission lines fall into two broad categories: corona effects and field effects. Corona is the ionization of the air that occurs at the surface of the energized conductor and suspension hardware due to very high electric field strength at the surface of the metal during certain conditions. Corona may result in radio and television reception interference, audible noise, light, and production of ozone. Corona is a function of the voltage of the line, the diameter of the conductor (or bundle of conductors), and the condition of the conductor and hardware. Field effects are the voltages and currents that may be induced in nearby conducting objects. The electric and magnetic fields of a 60-hertz (Hz) transmission line cause these effects.

3.3.2.1 Electric and Magnetic Fields

Operating power lines, like the energized components of electrical motors, home wiring, lighting, and electrical appliances, produce electric and magnetic fields, commonly referred to as EMF. The EMF produced by the alternating current electrical power system in the United States has a frequency of 60 Hz.

The 60-Hz power line fields are considered to be extremely low frequency. Electric and magnetic fields of power transmission lines at 60-Hz frequency have very low energy that does not cause heating or ionization. The 60-Hz fields do not radiate, unlike radio-frequency fields.

Electric fields around transmission lines are produced by electrical charges on the energized conductor. Electric field strength is directly proportional to the line’s voltage; that is, increased voltage produces a stronger electric field. The electric field is inversely proportional to the distance from the conductors, so that the electric field strength declines as the distance from the conductor increases. The strength of the electric field is measured in units of kilovolts per meter. The electric field around a transmission line remains practically constant and is not affected by the common daily and seasonal fluctuations in usage of electricity by customers.

Magnetic fields around transmission lines are produced by the level of current flow—measured in units of amperes—through the conductors. The magnetic field strength is also directly proportional to the current; that is, increased amperes produce a stronger magnetic field. The magnetic field is inversely proportional to the distance from the conductors. Thus, like the electric field, the magnetic field strength declines as the distance from the conductor increases. Magnetic fields are expressed in units of milligauss. The flow of current fluctuates daily and seasonally, as does the magnetic field around transmission lines.

Considerable research has been conducted over the last 30 years on the possible biological effects and human health effects from EMF. This research has produced various studies that offer no uniform conclusions about whether long-term exposure to EMF is harmful or not. In the absence of conclusive or evocative evidence, some states—California in particular—have chosen not to specify maximum acceptable levels of EMF. Instead, these states mandate a program of prudent avoidance, whereby EMF exposure to the public is minimized, by encouraging electric utilities to use low-cost techniques to reduce the levels of EMF.

3.3.2.2 Audible Noise

Audible noise on transmission lines and structures is due to the effects of corona. Corona is a function of transmission line voltage, conductor diameter, condition of the conductor, and the suspension hardware. The electric field gradient is the rate at which the electric field changes and is directly related to the line voltage. The electric field gradient is greatest at the surface of the conductor. Large-diameter conductors have lower electric field gradients at the conductor surface and, hence, lower corona than smaller conductors, everything else being equal. Irregularities (such as nicks and scrapes on the conductor surface) or sharp edges on suspension hardware concentrate the electric field at these locations and, thus, increase corona at these spots. Similarly, contamination on the conductor surface, such as dust or insects, can cause irregularities that are a source for corona. Raindrops, snow, fog, and condensation are also sources of irregularities. Corona typically becomes a design concern for transmission lines at 345-kV voltage and above.

3.3.2.3 EMF Assumptions

It is important that any discussion of EMF include the assumptions used to calculate these values and consider that the EMF in the vicinity of the power lines varies with regard to line design, line loading, distance from the line, and other factors. The electric field depends upon the line voltage, which remains nearly constant for a transmission line during normal operation. In their calculations, CECP and SDG&E will use a worst-case voltage of 242 kV (230 kV + 5 percent) for the 230-kV lines and a worst-case voltage of 145 kV (138 kV + 5 percent) for the 138-kV lines.

The magnetic field is proportional to line loading (amperes), which varies as power plant generation is changed by the system operators to meet increases or decreases in electrical demand. Line loading values used for the EMF calculations are based on the nominal output rating of the connected generators.

The CECP will produce a maximum of 280 MW from Unit 7 for interconnection to the new SDG&E 230-kV switchyard south of the Canon substation. The transmission line connecting Unit 7 generation to the new SDG&E 230-kV switchyard will be routed partly overhead and partly underground using 230-kV cables, and the line will be entirely inside the property lines of the Encina Power Plant and adjoining SDG&E property. The plant and SDG&E sites are not accessible to the public; therefore, the public will not be exposed to any EMF levels.

The CECP will produce a maximum of 280 MW from Unit 6 for interconnection to SDG&E 138-kV Encina switchyard. The transmission line connecting Unit 6 generation to the SDG&E 138-kV Encina switchyard will be routed entirely inside the plant property line. The plant is not accessible to the public and, as such, EMF exposure from this transmission line by the public will not be an issue. At the Unit 6 area, the line is closest to the plant property line (about 260 feet from the east property line). From the 138-kV switchyard, the line is about 1,300 feet from the nearest residence. This 280-MW Unit 6 generation addition will replace the generation capacity from retiring Encina Generating Unit 1, 2, and 3 with 330 MW, with a net generation reduction of 50 MW. This reduction will not impact the capacities of the outgoing 138-kV transmission lines from SDG&E Encina 138-kV switchyard; therefore, the EMF levels for these lines will not change.

The following figures illustrate the plan view of the interconnection between Unit 6 and Unit 7 and the SDG&E 230-kV and 138-kV switchyards. Other figures show the cross sections of the transmission line poles at different locations, take-off structures, and cable riser poles.

- Figure 3.1-7 illustrates the plan view of the interconnection alignments.
- Figure 3.2-4 shows a cross section of the 138-kV and 230-kV dead-end poles used at several locations, as shown on Figure 3.2-7.
- Figure 3.2-5 shows a cross section of the 138-kV tangent pole with option to change phase configuration from the previous pole.
- Figure 3.3-6 shows a cross section of the 138-kV dead-end angle pole.
- Figure 3.2-2 shows circuit breakers and sections of the 138 & 230-kV take-off structures at the GSU transformers of Unit 6 and Unit 7.
- Figure 3.2-3 shows section of the H-frame structure for 230-kV overhead line and cable termination stand.
- Figure 3.2-7 shows 138-kV and 230-kV line pole cross section, double-circuit dead-end configuration.

3.3.2.4 Transmission Line EMF Reduction

While the State of California does not set a statutory limit for EMF levels, the CPUC, which regulates electric transmission lines, mandates EMF reduction as a practicable design criterion for new and upgraded electrical facilities. As a result of this mandate, the regulated electric utilities have developed their own design guidelines to reduce EMF at each new facility. The CEC, which regulates transmission lines to the point of connection, requires independent power producers to follow the existing guidelines that are in use by local electric utilities or transmission-system owners.

In keeping with the goal of EMF reduction, the interconnection of the CECP will be designed and constructed using the principles outlined in the SDG&E and SCE publications, "EMF Design Guidelines for Electrical Facilities." These guidelines explicitly incorporate the directives of the CPUC by developing design procedures compliant with Decision 93-11-013 and CPUC GOs 95, 128, and 131-D. That is, when the transmission line structures, conductors, and rights-of-way are designed and routed according to the SCE & SDG&E guidelines, the transmission line would be consistent with the CPUC mandate.

The primary techniques (per SCE & SDG&E guidelines) for reducing EMF anywhere along the line are to:

- Increase the pole height for overhead design.
- Use compact pole-head configuration.
- Minimize the current on the line.
- Optimize the configuration of the phases (A, B, C).

The CEC normally requires actual measurements of pre-interconnection background EMF for comparison with measurements of post-interconnection EMF levels. Because of the unique circumstances that ensure there will be no EMF changes caused by CECP, the Applicant does not believe that such measurements are necessary.

3.3.2.5 Conclusion on EMF and Audible Noise

After having evaluated the electrical effects of the high-voltage transmission lines, it is the Applicant's conclusion that:

- Electrical effects calculations do not have to be submitted with this AFC to the CEC for the 230-kV and 138-kV CECP interconnect transmission lines since these transmission lines are to be constructed on the property wholly-owned by Cabrillo Power I LLC and the adjoining SDG&E site, with no public receptors. No noticeable noise is expected from the proposed SDG&E 230-kV lines and switchyard south of the Canon substation, as noise levels are only perceptible above 345 kV.

- Electrical effects calculations do not have to be submitted with this AFC for the CECP existing 230-kV and 138-kV switchyards transmission line outlets since there is no change to the existing lines' electric field, audible noise, voltage, and line configuration. Power flows in the transmission system are in all directions and depend on imports, internal generation, transmission lines that may be out of service and system load demand. No change on the existing transmission lines conductor size is expected. The existing line EMF is based on the capacity rating of the transmission lines; therefore, the EMF levels for these lines will not change. SDG&E may assess any effects of the SDG&E proposed 230-kV switchyard and the new incoming transmission lines.

3.3.2.6 Induced Current and Voltages

A conducting object such as a vehicle or person in an electric field will have induced voltages and currents. The strength of the induced current will depend upon the field strengths, the size and shape of the conducting object, and the object-to-ground resistance. When a conducting object is isolated from the ground and a grounded person touches the object, a perceptible current or shock may occur as the current flows through the person to ground. To prevent such situations and to mitigate hazardous and nuisance shocks, all metallic objects below and near the transmission lines will be grounded, at several locations if necessary, for fences and pipes that run parallel to the transmission lines. Adequate clearances will be maintained above roads, railroad lines, and parking facilities to minimize induced currents in vehicles and people to safe levels.

The CECP interconnection transmission lines will run parallel to and cross over an existing railroad. CECP will coordinate with the railroad to minimize any interference with the railroad cars and signal and communications circuits. The proposed routing of the 230-kV and 138-kV lines will be constructed in conformance with GO-52, GO-95, and 8 CCR Section 2700 requirements. A minimum of 34 feet of vertical clearance will be maintained when the lines cross over the railroad.

It is not anticipated that hazardous shocks will occur as a result of the CECP project construction or operation.

3.3.2.7 Communications (Radio/TV) Interference

Corona from transmission lines can cause interference with radio and television reception. Corona typically becomes a design concern for transmission lines having voltages of 345 kV and above. Corona on the 138-kV and 230-kV interconnection transmission lines will be minimized by proper selection of hardware and conductors. A survey will be performed of the ambient noise levels before construction, which will be compared with noise levels measured after the construction and energization.

Any interference issues from public will be reviewed, and any required repairs will be performed to mitigate the interference.

3.3.3 Aviation Safety

Federal Aviation Administration (FAA) Regulations, 14 CFR Part 77 establishes standards for determining obstructions in navigable airspace in the vicinity of airports that are available for public use and are listed in the Airport Directory of the current Airman’s Information Manual. These regulations set forth requirements for notification of proposed obstruction that extend above the earth’s surface. FAA notification is required for any potential obstruction structure that reaches over 200 feet above ground level. Also, notification is required if the obstruction is greater than specified heights and falls within any restricted airspace in the approach to airports. For airports with runways longer than 3,200 feet, the restricted space extends 20,000 feet (3.3 nautical miles) from the runway, with no obstruction greater than a 100:1 ratio of the distance from the runway. For airports with runways measuring 3,200 feet or less, the restricted space extends 10,000 feet (1.7 nautical miles), with a 50:1 ratio of the distance from the runway. For heliports, the restricted space extends 5,000 feet (0.8 nautical mile), with a 25:1 ratio.

McClellan Palomar Airport is located about 14,300 feet away from the CECP project transmission line interconnection to the existing SDG&E Encina switchyards. The separation to this airport requires that FAA be notified if the proposed transmission pole height exceeds 143 feet (100:1 ratio of distance from runway to pole height). The CECP will comply with this limit by designing the interconnect-transmission line pole to be less than 143 feet tall. At 400 feet, the existing exhaust stack at the EPS is currently, and will remain, the tallest structure on the EPS site.

There is no heliport located within 5,000 feet of the CECP site. The CECP, including the transmission line interconnection, will pose no deterrent to aviation safety as defined and regulated in 14 CFR Part 77 of the FAA regulations.

3.3.4 Fire Hazards

The proposed 230-kV/138-kV interconnecting transmission lines within the existing EPS site to SDG&E 138-kV and 230-kV switchyards will be designed, constructed, and maintained in accordance with CPUC GO-95. CPUC GO-95 establishes clearances from other man-made and natural structures as well as tree-trimming requirements to mitigate fire hazards. The trees along the existing railroad corridor that crosses the CECP site can present a fire hazard. These trees will be trimmed as necessary, and a distance will be maintained from these trees to the CECP transmission line interconnection. However, it is unlikely that any vegetation management will be required because the entire proposed route is over areas that have existing transmission and distribution lines. CECP or their designate will maintain the interconnection corridor in accordance with accepted industry practices. This will include identification and abatement of any fire hazards to ensure safe operation of the line.

3.4 Applicable Laws, Ordinances, Regulations, and Standards

This section provides a list of applicable LORS that apply to the proposed interconnecting transmission line, switchyard/substation, and engineering during the construction and operations phases of the CECP. The following compilation of LORS is in response to Section (h), of Appendix B attached to Article 6, of Chapter 6, of 20 CCR. Inclusion of these data is further outlined in the CEC's publication entitled *Rules of Practice and Procedure & Power Plant Site Certification Regulations*.

3.4.1 Design and Construction

Table 3.4-1 lists the applicable LORS for the design and construction of the proposed transmission line and connection to the existing SDG&E switchyard.

TABLE 3.4-1
Design and Construction LORS

LORS	Applicability	AFC Section Explaining Conformance
GO-95, CPUC, “Rules for Overhead Electric Line Construction”	CPUC rule covers required clearances, grounding techniques, maintenance, and inspection requirements.	3.2.2.1 3.2.2.2
8 CCR, Section 2700 et seq. “High Voltage Electrical Safety Orders”	Establishes essential requirements and minimum standards for installation, operation, and maintenance of electrical installation and equipment to provide practical safety and freedom from danger.	3.2.2.1 3.2.2.2
GO-128, CPUC, “Rules for Construction of Underground Electric Supply and Communications Systems”	Establishes requirements and minimum standards to be used for the underground installation of AC power and communications circuits.	3.2.2.1 3.2.2.2
GO-52, CPUC, “Construction and Operation of Power and Communication Lines”	Applies to the design of facilities to provide or mitigate inductive interference.	3.2.2 3.3.1 3.3.2
ANSI/IEEE 693 “IEEE Recommended Practices for Seismic Design of Substations”	Provides recommended design and construction practices.	3.2.2.1 3.2.2.2
IEEE 1119 “IEEE Guide for Fence Safety Clearances in Electric-Supply Stations”	Provides recommended clearance practices to protect persons outside the facility from electric shock.	3.2.2
IEEE 998 “Direct Lightning Stroke Shielding of Substations”	Provides recommendations to protect electrical system from direct lightning strokes.	3.2.2
IEEE 980 “Containment of Oil Spills for Substations”	Provides recommendations to prevent release of oil into the environment.	3.2.2.1 3.2.2.2
Suggestive Practices for Raptor Protection on Power lines, April 1996	Provides guidelines to avoid or reduce raptor collision and electrocution	3.2.2.1 3.2.2.2

ANSI = American National Standards Institute.
IEEE = Institute of Electrical and Electronics Engineers.

3.4.2 Electric and Magnetic Fields

The applicable LORS pertaining to electric and magnetic field interference are tabulated in Table 3.4-2.

TABLE 3.4-2
Electric and Magnetic Field LORS

LORS	Applicability	AFC Section Explaining Conformance
Decision 93-11-013 of the CPUC	CPUC position on EMF reduction.	3.2.2 3.3.2
GO-131-D, CPUC, Rules for Planning and Construction of Electric Generation, Line, and Substation Facilities in California	CPUC construction-application requirements, including requirements related to EMF reduction.	3.2.2 3.3.2
EMF Design Guidelines for Electrical Facilities, Southern California Edison Company, EMF Research and Education, 6090 Irwindale Avenue, Irwindale, California 91702, (626) 812-7545, September 2004	Large local electric utility's guidelines for EMF reduction through structure design, conductor configuration, circuit phasing, and load balancing (in keeping with CPUC D.93-11-013 and GO-131).	3.2.2 3.3.2
ANSI/IEEE 644-1994 "Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines"	Standard procedure for measuring EMF from an electric line that is in service.	3.3.2

ANSI = American National Standards Institute.
IEEE = Institute of Electrical and Electronics Engineers.

3.4.3 Hazardous Shock

Table 3.4-3 lists the LORS regarding hazardous shock protection for the CECP.

TABLE 3.4-3
Hazardous Shock LORS

LORS	Applicability	AFC Section Explaining Conformance
Title 8 CCR Section 2700 et seq. "High Voltage Electrical Safety Orders"	Establishes essential requirements and minimum standards for installation, operation and maintenance of electrical equipment to provide practical safety and freedom from danger.	3.2.2.1 3.2.2.2
ANSI/IEEE 80 "IEEE Guide for Safety in AC Substation Grounding"	Presents guidelines for assuring safety through proper grounding of AC outdoor substations.	3.2.2.1 3.2.2.2
National Electrical Safety Code, ANSI C2, Section 9, Article 92, Paragraph E; Article 93, Paragraph C	Covers overhead clearances for electrical supply and communications overhead lines.	3.2.2.1 3.2.2.2

ANSI = American National Standards Institute.
IEEE = Institute of Electrical and Electronics Engineers.

3.4.4 Communication Interference

The applicable LORS pertaining to communication interference are tabulated in Table 3.4-4.

TABLE 3.4-4
Communications Interference LORS

LORS	Applicability	AFC Section Explaining Conformance
47 CFR Section 15.25, "Operating Requirements, Incidental Radiation"	Prohibits operations of any device emitting incidental radiation that causes interference to communications. The regulation also requires mitigation for any device that causes interference.	3.2.2 3.3.1 3.3.2
GO-52, CPUC	Covers all aspects of the construction, operation, and maintenance of power and communication lines and specifically applies to the prevention or mitigation of inductive interference.	3.2.2.1 3.2.2.2 3.3.2.4
CEC staff, Radio Interference and Television Interference (RI-TVI) Criteria (Kern River Cogeneration) Project 82-AFC-2, Final Decision, Compliance Plan 13-7	Prescribes the CEC's RI-TVI mitigation requirements, developed and adopted by the CEC in past siting cases.	3.2.2.1 3.2.2.2 3.3.2.5

3.4.5 Aviation Safety

Table 3.4-5 lists the aviation safety LORS that may apply to the construction and operation of the CECP.

TABLE 3.4-5
Aviation Safety LORS

LORS	Applicability	AFC Section Explaining Conformance
14 CFR Part 77 "Objects Affecting Navigable Airspace"	Describes the criteria used to determine whether a "Notice of Proposed Construction or Alteration" (NPCA, FAA Form 7460-1) is required for potential obstruction hazards in navigable airspace.	3.2.2.1 3.2.2.2 3.3.3
FAA Advisory Circular No. 70/7460-1G, "Obstruction Marking and Lighting"	Describes the FAA standards for marking and lighting of obstructions as identified by FAA Regulations Part 77.	3.2.2.1 3.2.2.2 3.3.3
Public Utilities Code, Sections 21656-21660	Discusses the permit requirements for construction of possible obstructions in the vicinity of aircraft landing areas, in navigable airspace, and near the boundary of airports.	3.2.2.1 3.2.2.2 3.3.3

3.4.6 Fire Hazard

Table 3.4-6 tabulates the LORS governing fire hazard protection for the CECP.

TABLE 3.4-6
Fire Hazard LORS

LORS	Applicability	AFC Section Explaining Conformance
14 CCR Sections 1250-1258, "Fire Prevention Standards for Electric Utilities"	Provides specific exemptions from electric pole and tower firebreak and electric conductor clearance standards, and specifies when and where standards apply.	3.2.2 3.3.4
ANSI/IEEE 80 "IEEE Guide for Safety in AC Substation Grounding"	Presents guidelines for assuring safety through proper grounding of AC outdoor substations.	3.2.2.1 3.2.2.2 3.3.4
GO-95, CPUC, "Rules for Overhead Electric Line Construction" Section 35	CPUC rule covers all aspects of design, construction, operation, and maintenance of electrical transmission line and fire safety (hazards).	3.2.2 3.3.4

ANSI = American National Standards Institute.
IEEE = Institute of Electrical and Electronics Engineers.

3.4.7 Jurisdiction

Table 3.4-7 identifies federal, state, and local agencies with jurisdiction to issue permits or approvals, conduct inspections, and/or enforce the above referenced LORS. Table 3.4-7 also identifies the associated responsibilities of these agencies as they relate to the construction and operation of CECP.

TABLE 3.4-7
Agencies with Jurisdiction for Transmission System Engineering

Agency or Jurisdiction	Responsibility
CEC	Jurisdiction over new transmission lines associated with thermal power plants that are 50 MW or more (PRC, 25500).
CEC	Jurisdiction of lines out of a thermal power plant to the interconnection point to the utility grid (PRC, 25107).
CEC	Jurisdiction over modifications of existing facilities that increase peak operating voltage or peak kilowatt capacity 25 percent (PRC, 25123).
CPUC	Regulates construction and operation of overhead transmission lines. (General Order No. 95 and 131-D) (those not regulated by the CEC)
CPUC	Regulates construction and operation of power and communications lines for the prevention of inductive interference (GO-52).
FAA	Establishes regulations for marking and lighting of obstructions in navigable airspace (AC No. 70/7460-1G).
CAISO	Provides final interconnection approval.
City of Carlsbad	Establishes and enforces zoning regulations for specific land uses. Issues variances in accordance with zoning ordinances.

TABLE 3.4-7
Agencies with Jurisdiction for Transmission System Engineering

Agency or Jurisdiction	Responsibility
City of Carlsbad	Jurisdiction over safety inspection of electrical installations that connect to the supply of electricity (NFPA, 70).
City of Carlsbad	Issues and enforces certain ordinances and regulations concerning fire prevention and electrical inspection.

3.5 References

California Public Utilities Commission. *Decision 93-11-013.*

California Public Utilities Commission. *General Order 128 – Rules for Construction of Underground Electric Supply and Communications Systems*.

California Public Utilities Commission. *General Order 131D – Rules for Planning and Construction of Utilities Generation, Line, and Substation Facilities*.

California Public Utilities Commission. *General Order 52 – Construction and Operation of Power and Communication Lines*.

California Public Utilities Commission. *General Order 95 – Rules for Overhead Electric Line Construction*.

Electric Power Research Institute. 1975. *Transmission Line Reference Book, 345-kV and Above*. Palo Alto, California.

Electric Power Research Institute. 1978. *Transmission Line Reference Book, 115-138kV Compact Line Design*. Palo Alto, California.

EMF Research and Education. 2004. *EMF Design Guidelines for Electrical Facilities, Southern California Edison Company*. Irwindale, California. September.

Institute of Electrical and Electronics Engineers Power Engineering Society. 1985. *Corona and Field Effects of AC Overhead Transmission Lines, Information for Decision Makers*. July.

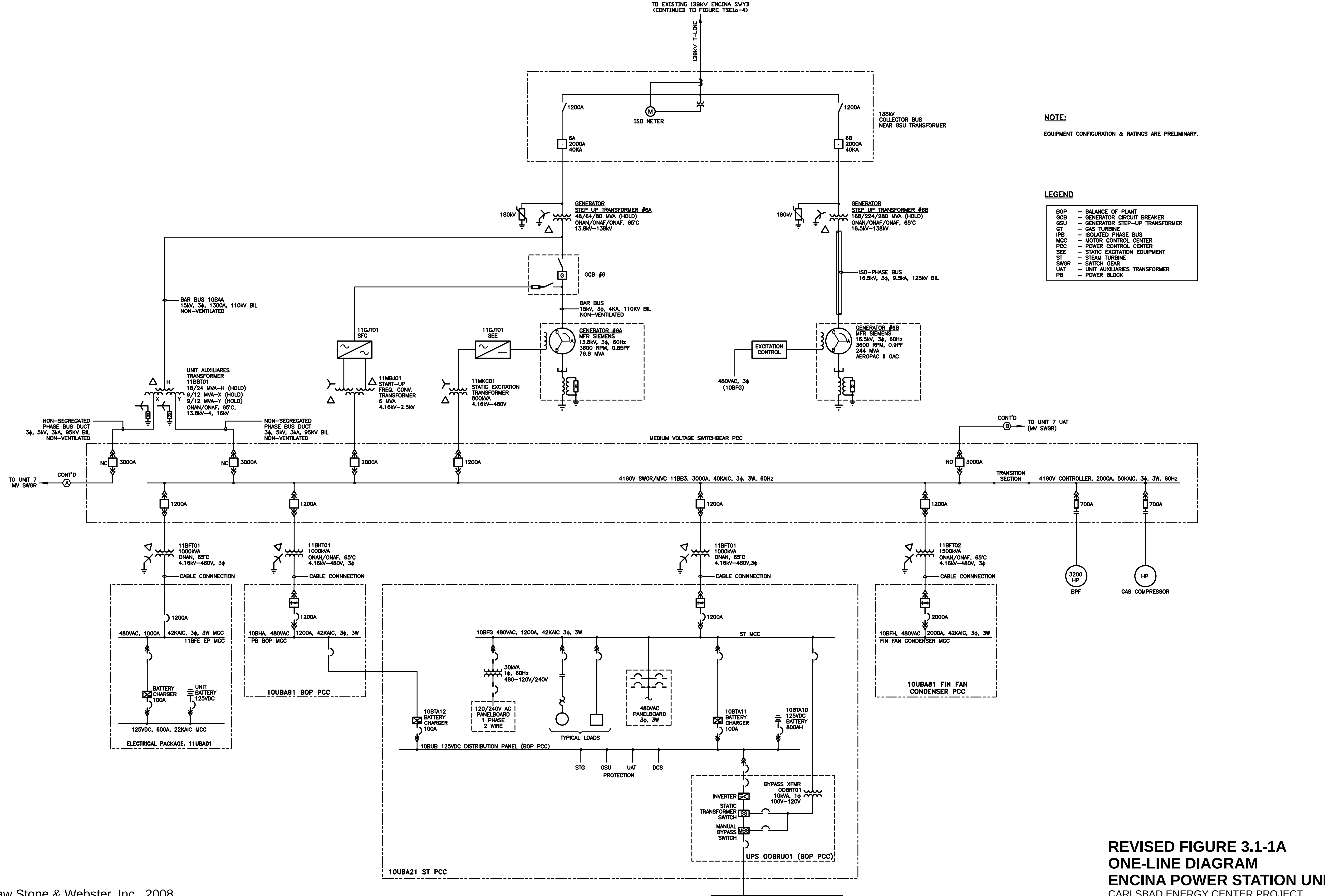
National Electrical Safety Code. *American National Standards Institute C2*.

Southwire. *Overhead Conductor Manual*.

United States of America. 14CFR1250-1258 – Fire Prevention Standards for Electric Utilities.

United States of America. 15CFR77 – Objects Affecting Navigable Airspace.

United States of America. 47CFR15.25 – Operating Requirements, Incidental Radiation.



Source: Shaw Stone & Webster, Inc., 2008

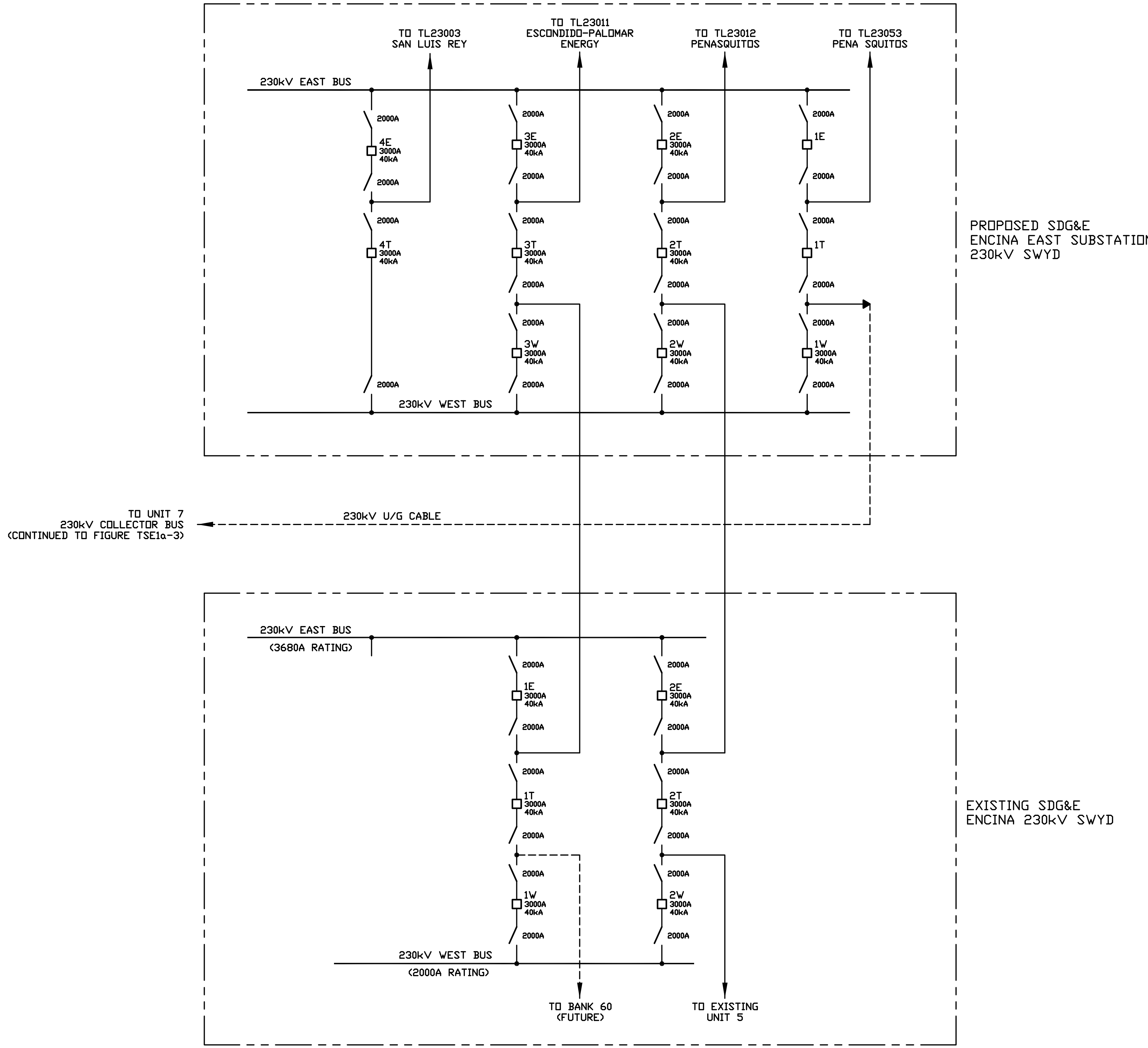
REVISED FIGURE 3.1-1A
ONE-LINE DIAGRAM
ENCINA POWER STATION UNIT 6
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

CH2MHILL

EY072007001SAC Figure_3.1-1a.ai 7/21/2008 tdaus

NOTE:

EQUIPMENT CONFIGURATION & RATINGS ARE PRELIMINARY.

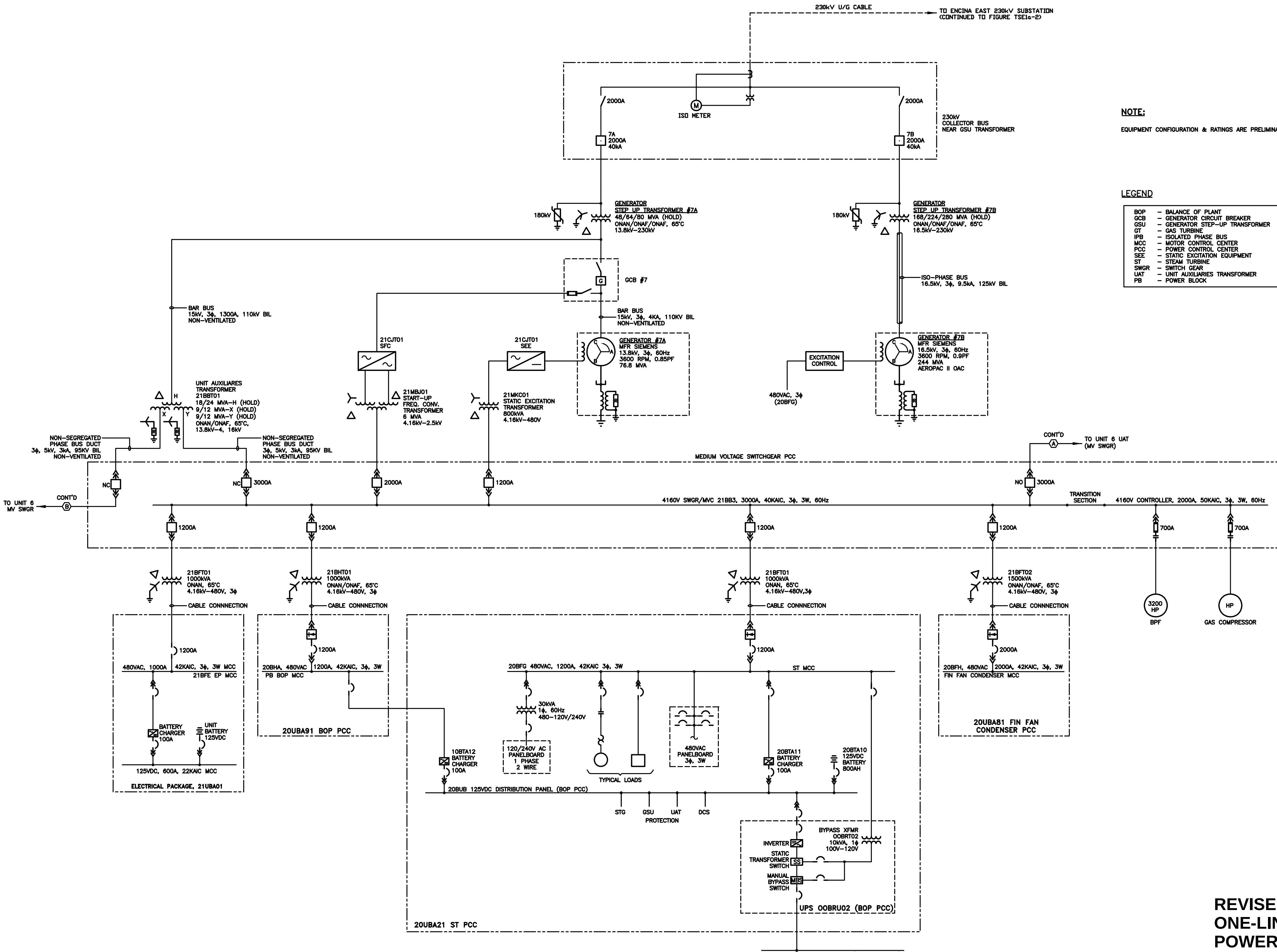


Source: Shaw Stone & Webster, Inc., 2008

REVISED FIGURE 3.1-1B
ONE-LINE DIAGRAM PROPOSED INTERCONNECTION TO SDG&E ENCINA 230kV SWITCHYARD
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

CH2MHILL

EY072007001SAC Figure_3.1-1b.ai 7/21/2008 tdaus

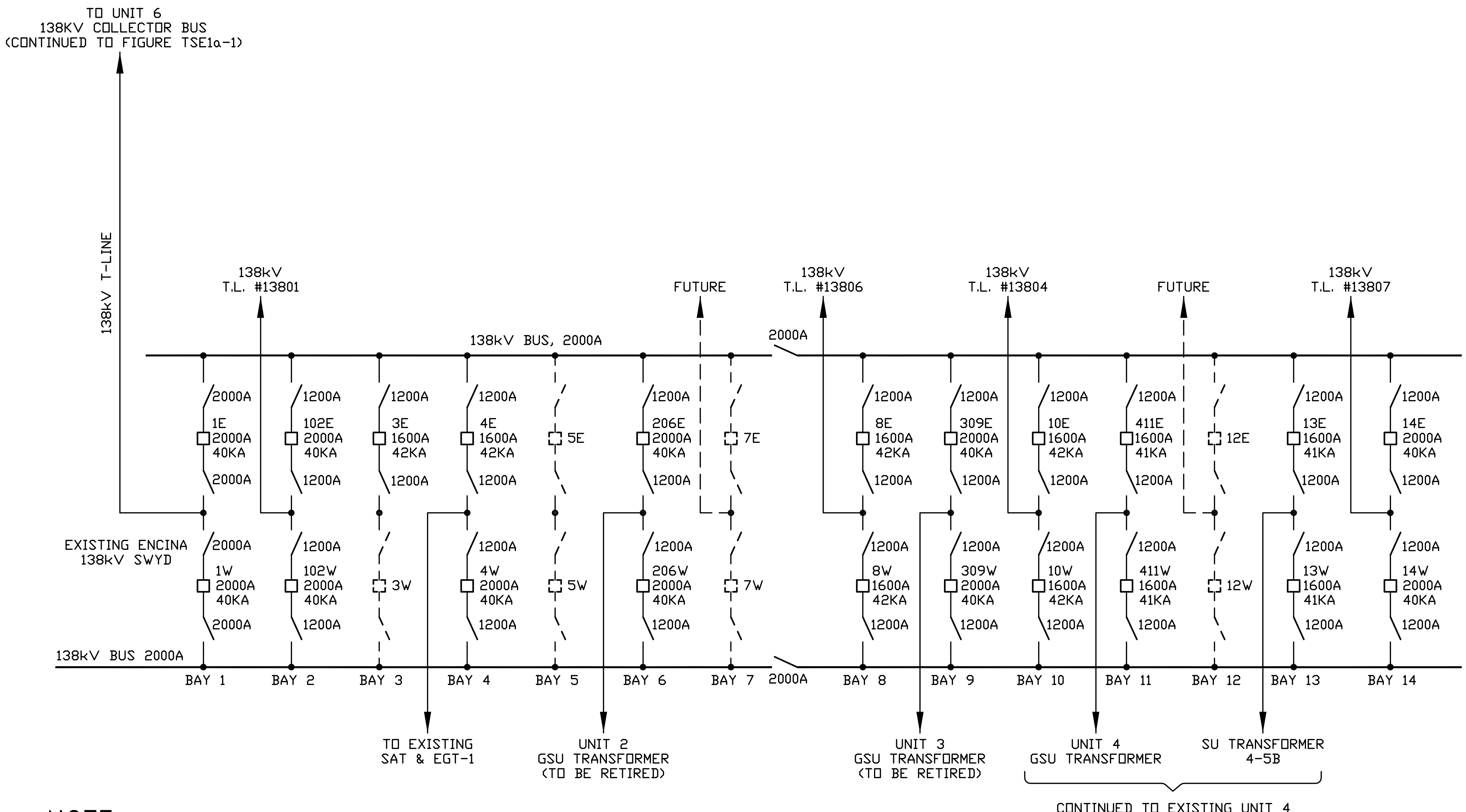


REVISED FIGURE 3.1-1C
ONE-LINE DIAGRAM ENCINA
POWER STATION UNIT 7
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

Source: Shaw Stone & Webster, Inc., 2008

CH2MHILL

EY072007001SAC Figure_3.1-1c.ai 07/21/2008 tdaus



NOTE:

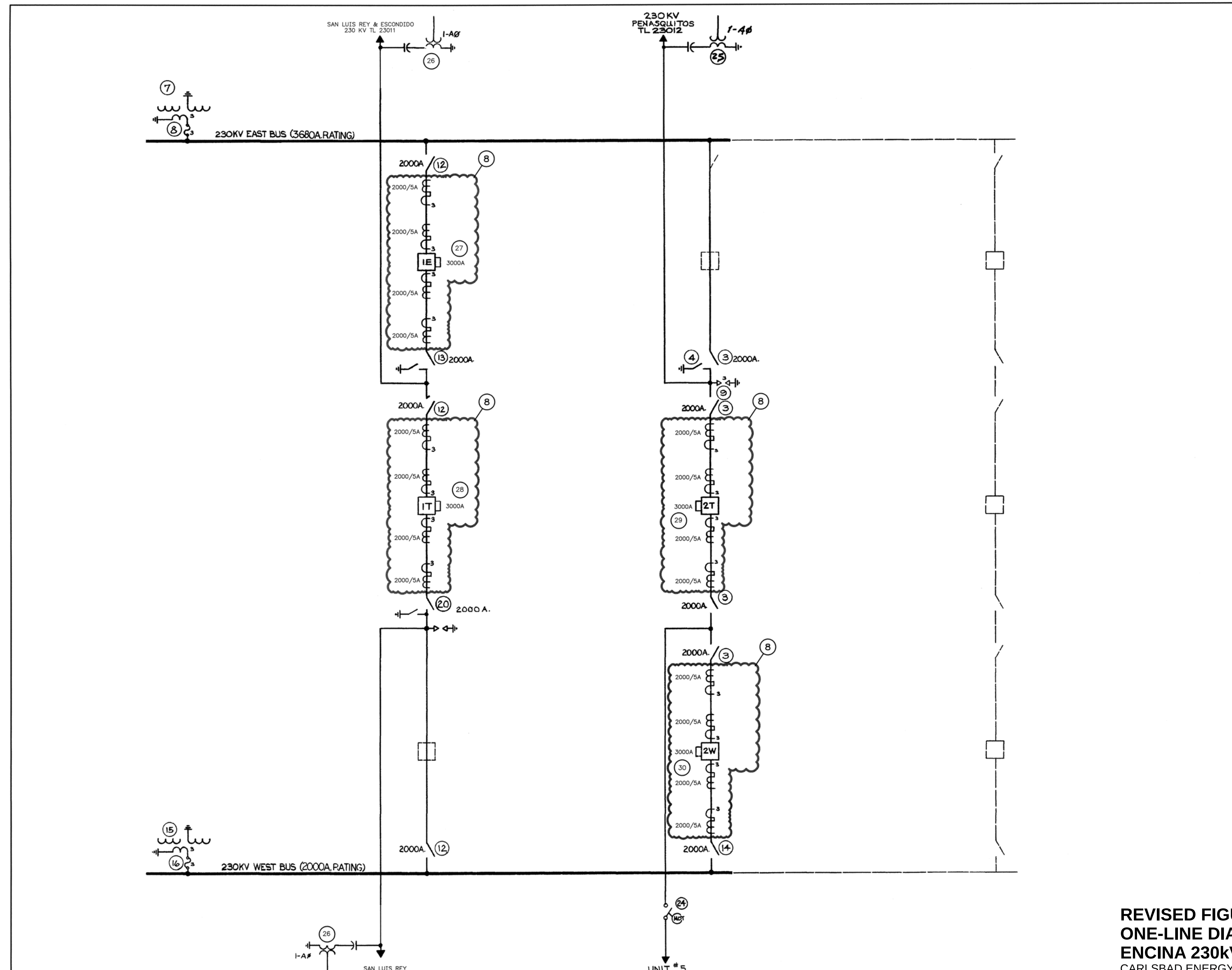
EQUIPMENT CONFIGURATION & RATINGS ARE PRELIMINARY.

Source: Shaw Stone & Webster, Inc., 2008

REVISED FIGURE 3.1-1D
ONE-LINE DIAGRAM PROPOSED INTERCONNECTION TO SDG&E ENCINA 138kV SWITCHYARD
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

CH2MHILL

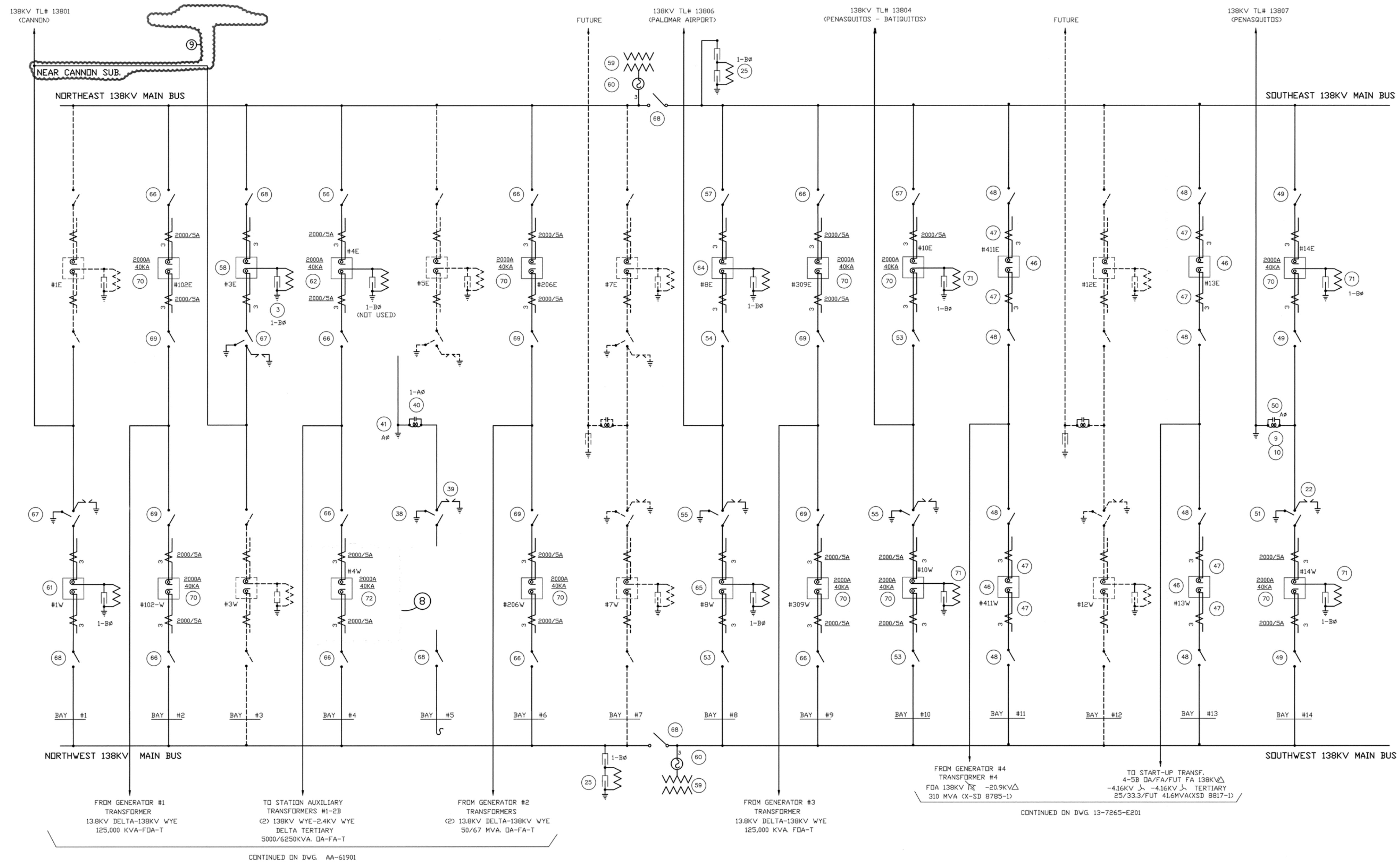
EY072007001SAC Figure_3.1-1d.ai 07/21/2008 tdaus



Source: Shaw Stone & Webster, Inc., 2008

REVISED FIGURE 3.1-1E
ONE-LINE DIAGRAM SDG&E
ENCINA 230kV SWITCHYARD
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

CH2MHILL



Source: Shaw Stone & Webster, Inc., 2008

REVISED FIGURE 3.1-1F
ONE-LINE DIAGRAM SDG&E
ENCINA 138kV SWITCHYARD
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

CH2MHILL

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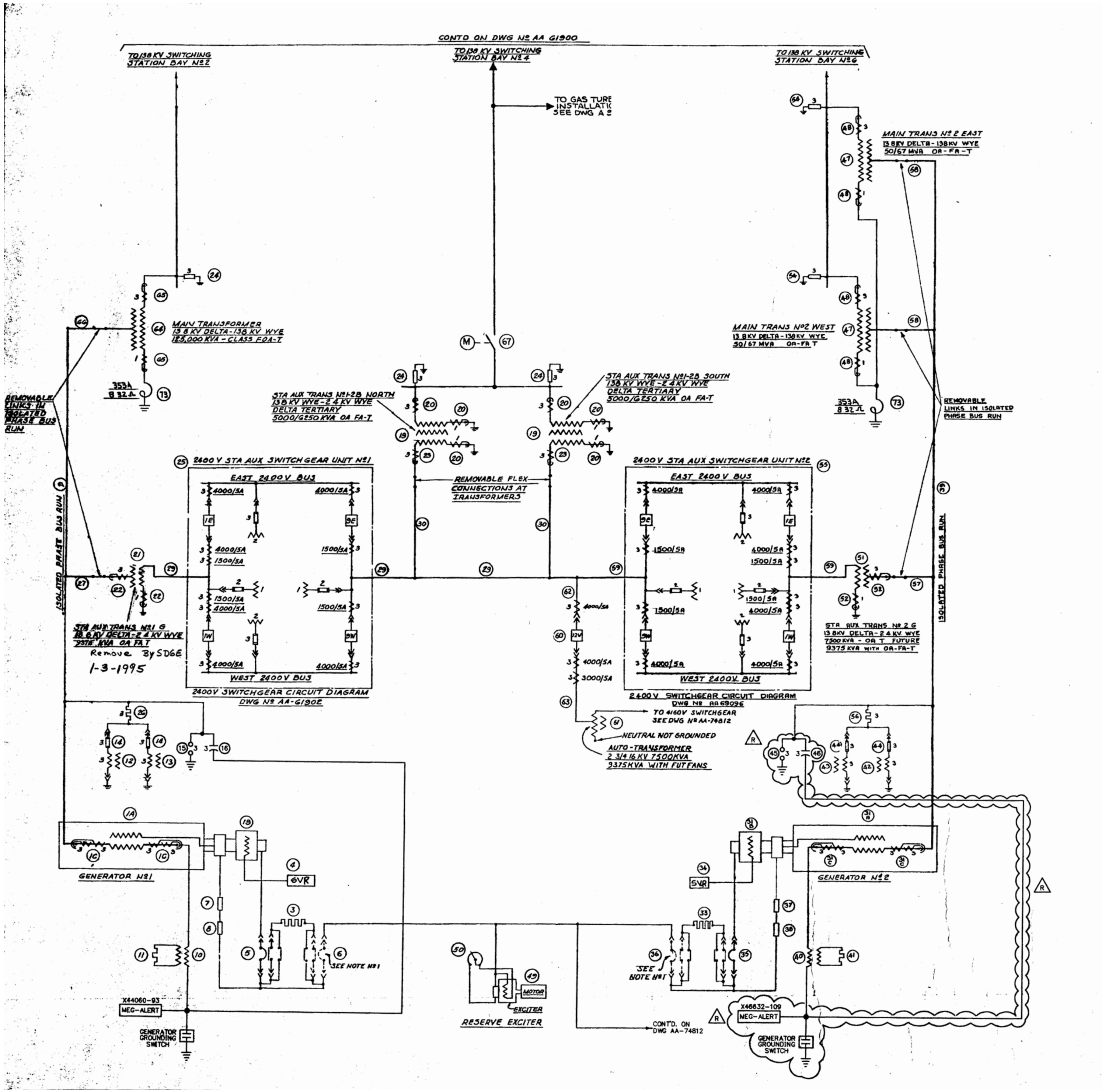

LIST OF EQUIPMENT

REF Nº	DESCRIPTION	TYPE AND RATING	SAN DIEGO ORDER Nº	MFRS DWG REF Nº	PROJECT Nº
1A	STEAM TURBINE DRIVEN GENERATOR	G E Co 90,000 KW .85PF 13.8KV 3600 RPM 3φ 60~ HYDROGEN COOLED	5316	X-44060-[illegible]	1311-7122
1B	DIRECT CONNECTED GEARED EXCITER	G E CO 290KW 375V 1131 RPM	5316	X 44060-37	1311 7122
1C	GENERATOR BUSHING CURRENT TRANSFORMER	G E CO 6000/5A RELAY & METERING TYPE 2 C/T PER BUSHING	5316	X 44060-[illegible]	1311-7122
2					
3	GENERATOR FIELD DISCHARGE RESISTOR	G E CO (MTD IN EXCITATION CUBICLE)	5316	X 44060-[illegible]	1311 7122
4	STATIC VOLTAGE REGULATOR	G E CO TYPE DS3820SVRD	20025	X-20025	1311 7122
5	MAIN EXCITER BREAKER	G E CO TYPE ALF-2 3φ MOTOR OPERATED 750V D C 1000 AMPS	5316	X 44060-[illegible]	1311-7122
6	RESERVE EXCITER BREAKER CUBICLE	SEE NOTE Nº1	5316	X-44060 [illegible]	1311-7122
7	GENERATOR ROTOR TEMPERATURE RECORDER SHUNT	G.E. CO 1000 AMPERE 100 MILLIVOLT	5316	X 44060-[illegible]	1311-7122
8	GENERATOR FIELD AMMETER SHUNT	G E CO 1000 AMPERE 100 MILLIVOLT	5316	X 44060-[illegible]	1311-7122
9	ISOLATED PHASE MAIN GENERATOR BUS RUN	G E CO 3300 A 15KV INSULATION 15H 110KV BIL	5427	X 45415-12	1311-7122
10	GENERATOR NEUTRAL GROUNDING TRANSFORMER PYRANOL-FILLED	G E CO TYPE HS 15KVA 13 400/13 800-120/240V (CONN 240V) CAT #[illegible]	5427	X 45415-[illegible]	1311-7122
11	GENERATOR NEUTRAL TRANSFORMER SEC LOADING RESISTOR	G E CO .2 [illegible] OHM 300 AMP CONTINUOUS [illegible]	5427	X-45415-[illegible]	1311-7122
12	STATIC VOLTAGE REGULATOR POTENTIAL TRANSFORMER	G E CO TYPE JEG-5 14,400/120V 400VA MODEL [illegible]	5427	X-45415-[illegible]	1311-7122
13	INSTRUMENT AND RELAY POTENTIAL TRANSFORMER	G.E CO TYPE JEG-5 14,400/120V 400VA MODEL [illegible]	5427	X 45415-[illegible]	1311-7122
14	CURRENT LIMITING POTENTIAL TRANSFORMER FUSES	G E CO TYPE EJ-1 0.5E AMP L 6293011G19	5427	X 45415-[illegible]	1311-7122
15	SURGE PROTECTION ARRESTER	G E CO MODEL 9LA1HC55 15KV MAX STATION THYRITE	5427	X-45415-[illegible]	1311-7122
16	SURGE PROTECTION CAPACITOR	G E CO CAT 18F451 13.8KV 0.25 MFD	5427	X-45415-[illegible]	1311 7122
17					
18					
19	STATION AUXILIARY TRANSFORMER OA-FA-T TRANS Nº1 2B	[illegible] KVA - 138KV WYE 2.4KV WYE DELTA TERTIARY (8) 2½% FC TAPS BELOW 138KV	5444	X-45715-1	1311 7122
20	HIGH VOLTAGE AND NEUTRAL BUSHING CURRENT TRANSFORMER	MULTI-RATIO RELAY TYPE 1200/5A	5444	X 45715-4	1311-7122
21	STA AUX TRANS OA-FA-T 9375 KVA RATING TRANS Nº1G	G E CO 7500KVA 13.8KV DELTA-2.4KV WYE NO TAPS WITH FORCED AIR FANS	[illegible]	[illegible]	1311 7122
22	HIGH VOLTAGE & NEUTRAL BUSHING CURRENT TRANSFORMER	MULTI-RATIO RELAY TYPE 1200/5A	5443	X-45747-[illegible]	1311-7122
23	LOW VOLTAGE BUSHING CURRENT TRANSFORMER	MULTI-RATIO RELAY TYPE 2000/5A	5444	X-45715-4	1311-7122
24	LIGHTNING ARRESTER	G E CO STATION TYPE THYRITE CAT # 9LA1[illegible] 121KV LINE TO GROUND	5491	X 44875-1	1311-7122
25	2.4KV STATION AUXILIARY SWITCHGEAR	WESTINGHOUSE INDOOR 5KV METALCLAD	5469	X-45535-4	1311 7122
26	CURRENT LIMITING RESISTOR	G.E.CO P-6124256 G 3 .45 OHMS	5427	X 45415-[illegible]	1311-7122
27	ISOLATED PHASE BUS SECTION	G E CO 1200A 15KV INSULATION 15H 110KV B.I.L.	5427	X 45415 12	1311-7122
28					
29	2.4 KV METALCLAD BUS DUCT	WE CO 2500A 5KV INSULATION	5469	X-45535-[illegible]	1311 7122
30	2.4 KV METALCLAD BUS DUCT	WE CO 2000A 5KV INSULATION	5469	X-45535 5	1311-7122
31A	STEAM TURBINE DRIVEN GENERATOR	GE CO [illegible] 13.8KV 0.85PF 3600RPM 3φ 60~ HYDROGEN COOLED	5655	X 44632-[illegible]	1311 7139
31B	DIRECT CONNECTED GEARED EXCITER	G E CO 300KW 375V. 1131 RPM AIR COOLED	5655	X 44632-38	1311-7139
31C	GENERATOR BUSHING CURRENT TRANSFORMER		5655	X 44632 [illegible]	1311-7139
32					
33	GENERATOR FIELD DISCHARGE RESISTOR	G.E CO TYPE [illegible] MTD GRIDS IN EXCITATION CUBICLE	5655	X 44632-[illegible]	1311-7139
34	STATIC VOLTAGE REGULATOR	G.E. TYPE DS3820SVRB	20025	X-20025	1311-7139
35	MAIN EXCITER BREAKER	G E CO TYPE ALF-2 MOTOR OPERATED 375V 1000A	5655	X-44632-[illegible]	1311-7139
36	RESERVE EXCITER BREAKER CUBICLE	SEE NOTE Nº1	5655	X 44632-[illegible]	1311-7139
37	GENERATOR ROTOR TEMPERATURE RECORDER SHUNT	G E CO FORM [illegible] 1000A 100MV IN EXCITATION CUBICLE	5655	X 44632-61	1311-7139
38	GENERATOR FIELD AMMETER SHUNT	G E CO FORM [illegible] 1000A 100MV IN EXCITATION CUBICLE	5655	X 44632 61	1311-7139
39	ISOLATED PHASE MAIN GENERATOR BUS RUN	G E CO 3300 A 15KV INSULATION LEVEL 15H 110 KV IMPULSE LEVEL	6077	X 48037-[illegible]	1311-7139
40	GENERATOR NEUTRAL GROUNDING TRANSFORMER PYRANOL FILLED	G E CO TYPE HS [illegible]	6077	X 48037 [illegible]	1311-7139
41	GENERATOR NEUTRAL TRANSFORMER SECONDARY LOADING RESISTOR	G E CO 0.46 OHM 300 AMP CONTINUOUS [illegible]	6077	X 48037-[illegible]	1311-7139
42	STATIC VOLTAGE REGULATOR POTENTIAL TRANSFORMER	G E CO TYPE JEG 5 14,400/120V 400VA 60CY MODEL [illegible]	6077	X 48037-[illegible]	1311-7139
43	INSTRUMENT AND RELAY POTENTIAL TRANSFORMER	G E CO TYPE JEG 5 14,400/120V 400VA 60CY MODEL [illegible]	6077	X 48037-[illegible]	1311-7139
44	CURRENT LIMITING POTENTIAL TRANSFORMER FUSES	G E CO. TYPE EJ 1, L 6293011G 19	6077	X 48037 [illegible]	1311-7139
45	SURGE PROTECTION ARRESTER	GE CO CAT # 9LA1HC55, 15KV	6077	X 48037-[illegible]	1311-7139
46	SURGE PROTECTION CAPACITOR	GE CO CAT # 18F451, 13.8KV, 0.25 MFD	6077	X 48037-[illegible]	1311-7139
47	MAIN TRANSFORMER OA-FA-T	ALLIS CHALMERS 50,000/67,000 KVA 13 800 V DELTA 138,000 KV WYE (4) 2½% FC TAPS BELOW 138 KV	5710	X-46995-1	1311-7139
48	HIGH VOLTAGE AND NEUTRAL BUSHING CURRENT TRANSFORMER	MULTI RATIO-RELAY TYPE 1200/5A	5710	X-46995-[illegible]	1311 7139
49	RESERVE EXCITER-MOTOR DRIVEN	G E CO 300KW 375V SHUNT WOUND 450 HP MOTOR 2300V 1200 RPM 3φ 60~	6009	X 47281-1	1311-7139
50	RESERVE EXCITER FIELD RHEOSTAT	G E CO TYPE IC-8432 MOTOR OPERATED	6009	X 47281 3	1311-7139
51	STA AUX TRANS OA-T FUTURE OA FA T WITH 9375 KVA RATING TRANS Nº 2-G	ALLIS CHALMERS 7500 KVA 13.8KV DELTA 2.4KV WYE	6014	X 47338-1	1311-7139
52	HIGH VOLTAGE AND NEUTRAL BUSHING CURRENT TRANSFORMER	MULTI-RATIO RELAY TYPE 1200/5A	6014		1311-7139
53					
54	LIGHTNING ARRESTER	G E CO STATION TYPE THYRITE CAT # 9LA1HB108 121KV LINE TO GROUND	6099	X 47640-1	1311-7139
55	2.4KV STA AUX SWITCHGEAR	WE CO 5KV INDOOR-METALCLAD	6124	X 47869-1	1311-7139
56	CURRENT LIMITING RESISTOR	GE CO P-6242566-3	6077	X 48037-[illegible]	1311-7139
57	ISOLATED PHASE BUS SECTION	GE CO 1200A 15KV	6077	X 48037 2	1311-7139
58	ISOLATED PHASE BUS SECTION	GE CO 3000A 15KV	6077	X 48037 2	1311-7139
59	2.4KV METALCLAD BUS DUCT	WE CO	6124	X 47869-[illegible]	1311-7139
60	2.4KV STA AUX SWITCHGEAR	WE CO 5KV INDOOR-METALCLAD (TYPE 50 DH-250 2000 A C B)	6507	X-47869-[illegible]	1311-7155
61	AUTO TRANSFORMER OA-T 60	GE CO 2 3/4 16 KV 7500 KVA - 9375 KVA WITH FUTURE FANS	6404	X-49751-1	1311-7155
62	2.4KV METALCLAD BUS DUCT (INDOOR)	WE CO 2000 A 5KV INSULATION	6507	X-47869-22	1311-7155
63	2.4KV METALCLAD BUS DUCT (OUTDOOR)	WE CO 2000 A 5KV INSULATION	6507	X-47869-22	1311-7155
64	MAIN TRANSFORMER - FOA-T	GE CO TYPE FOA-T 60~ 3φ 125 000 KVA 138 000V WYE 13 800 DELTA (4) 2½% FC TAPS BELOW 138 KV	—	X 50985 2	1311-7178
65	HIGH VOLTAGE AND NEUTRAL BUSHING CURRENT TRANSFORMER	MULTI RATIO RELAY TYPE 1200/5A	—	X 50985 [illegible]	1311-7178
66	ISOLATED PHASE BUS SECTION	GE CO 5800A 15KV INSULATION 15H 110 KV B I L (BASED ON 60°C RISE)	6545	X-50673 1	SEE NOTE #2
67	MOTOR OPER DISC SWITCH	161KV 1200 AMP [illegible], 40,000 AMP [illegible] 208V 3φ MOTOR - 125V DC CONTROL	LOCAL 8156 1	X-	13 7238C
68	TRANSFORMER	WEST TYPE SL 3φ-60~ - 138/12.47/7.2 KV - 12/16/20 MVA	LOCAL 52000	X 54400-4	13-7238C
69	BUSHING CURRENT TRANSFORMER	WEST TYPE 1200/5A	LOCAL 52000	X-54400 4	13-7238C
70	BUSHING CURRENT TRANSFORMER	WEST TYPE 600/5A	LOCAL 52000	X 54400 4	13-7238C
71	BUSHING CURRENT TRANSFORMER	WEST TYPE 600/5A	LOCAL 52000	X 54400-4	13 7238C
72	BUSHING CURRENT TRANSFORMER	WEST TYPE O 600/5A	LOCAL 52000	X 54400 4	13 7238C
73	GROUND REACTOR - 25KVA	WEST 353A, 8.32 OHM	SDG&E [illegible]		

NOTE Nº1
RESERVE EXCITER BREAKER PURCHASED WITH UNIT Nº3 EQUIPMENT (SD 6383) PURPOSE-SPARE EXCITER BREAKER AND GENERATOR FIELD PREHEATING.

NOTE Nº2
ISOLATE PHASE BUS SECTION WAS INSTALLED TEMPORARILY ON PROJ 1311-7168 BUS DUCT TO BE INSTALLED PERMANENTLY ON PROJ 1311-7178.

REVISIONS

P W.O. 2533640
REVISED PER GEN. BUS MEG-ALERT ADDITION ADDED GENERATOR GROUNDING SWITCH & MEG-ALERT, ADDED EQUIP. NUMBERS. FOR UNIT 1
DWN: FTS 3/24/87
CHK'D: TJC 3/24/87
APPD:
APPD:

R W.O. 2533650
REVISED PER GEN. BUS MEG-ALERT ADDITION ADDED GENERATOR GROUNDING SWITCH & MEG-ALERT, FOR UNIT 2
DWN: FTS 3/25/87
CHK'D: TJC 3/25/87
APPD:
APPD:

Source: Shaw Stone & Webster, Inc., 2008

REVISED FIGURE 3.1-1G
ONE-LINE DIAGRAM
ENCINA POWER STATION
UNITS 1 & 2

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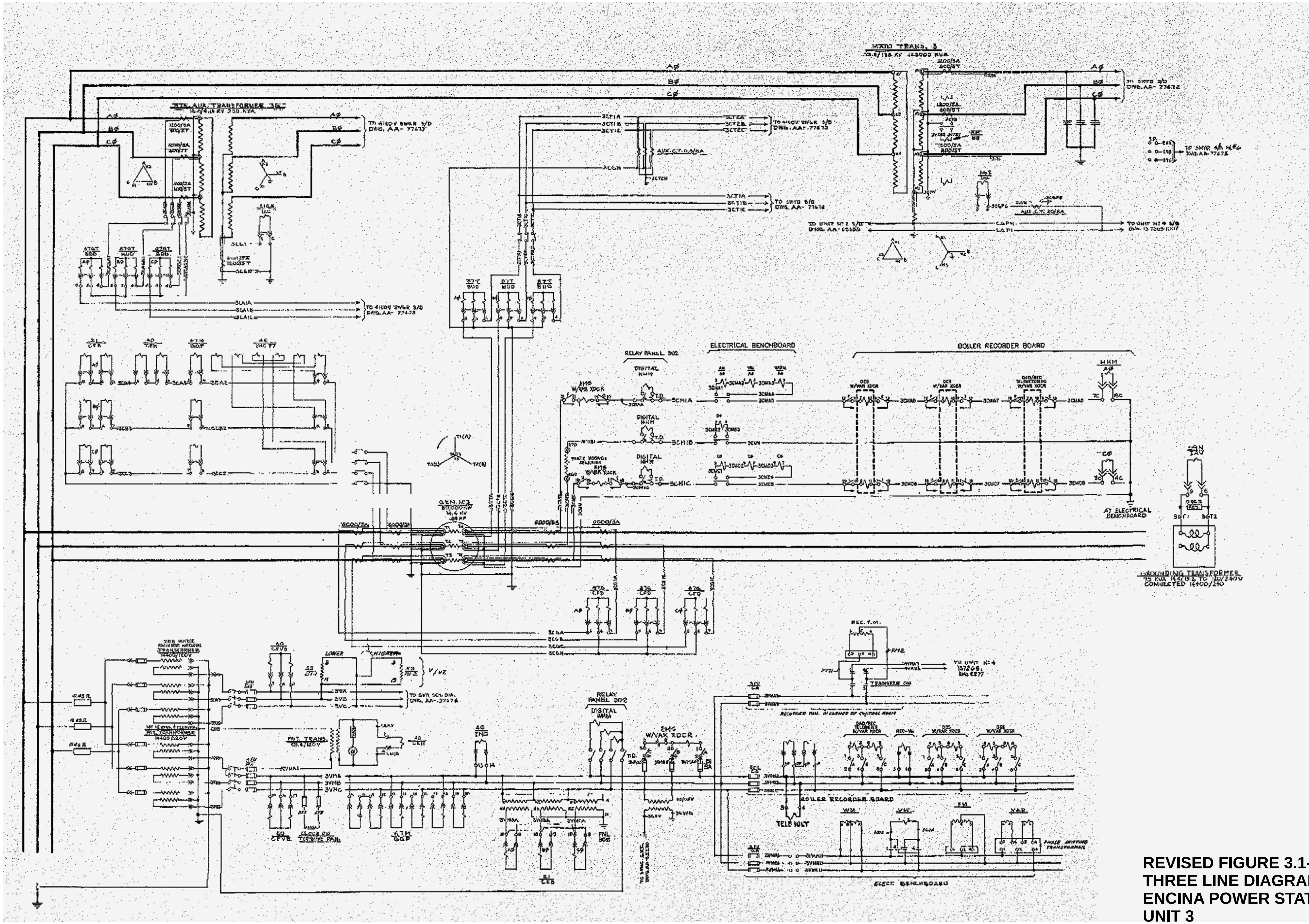

Source: Shaw Stone & Webster, Inc., 2008

REVISED FIGURE 3.1-1H
THREE LINE DIAGRAM
ENCINA POWER STATION
UNIT 3

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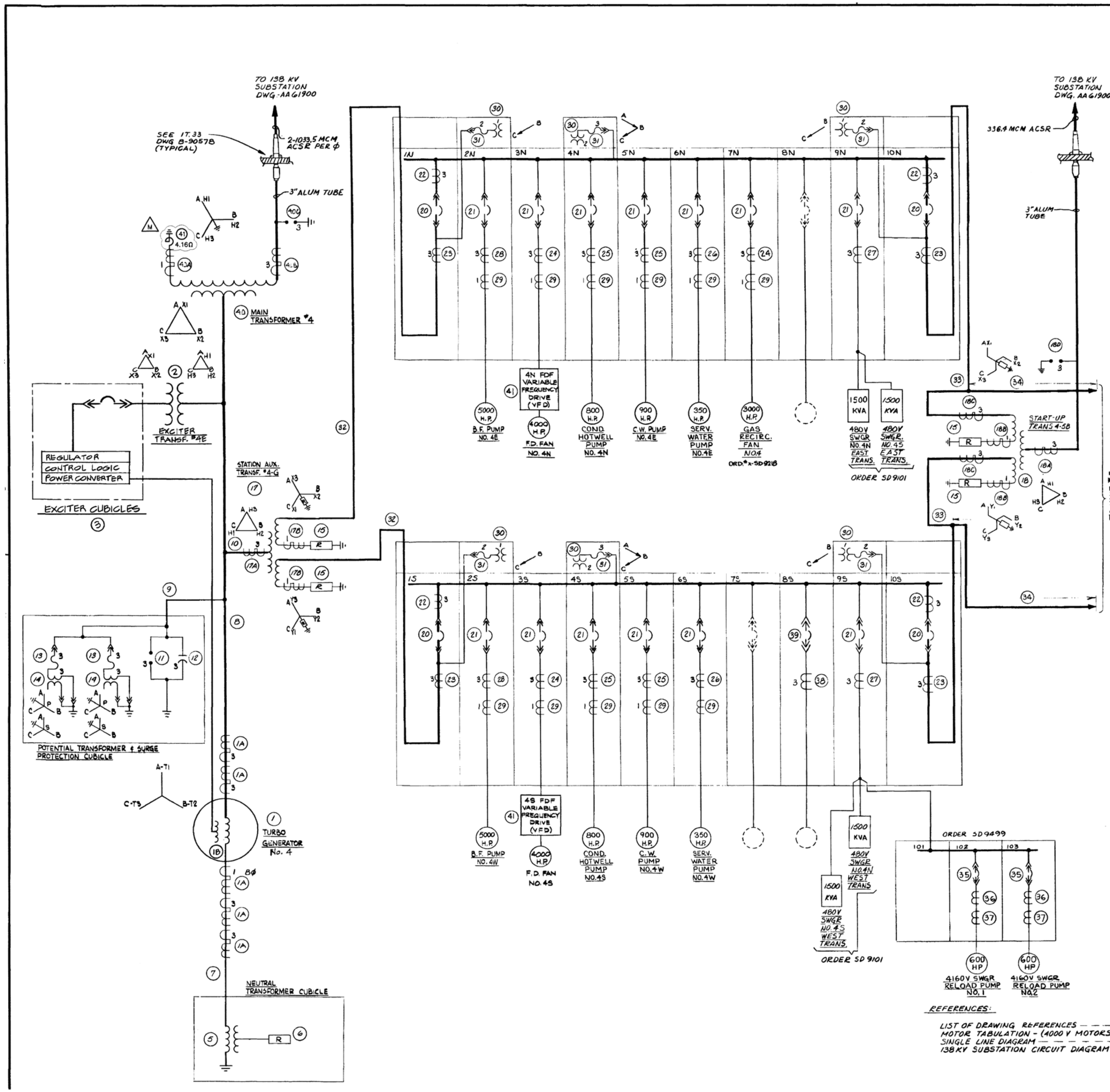
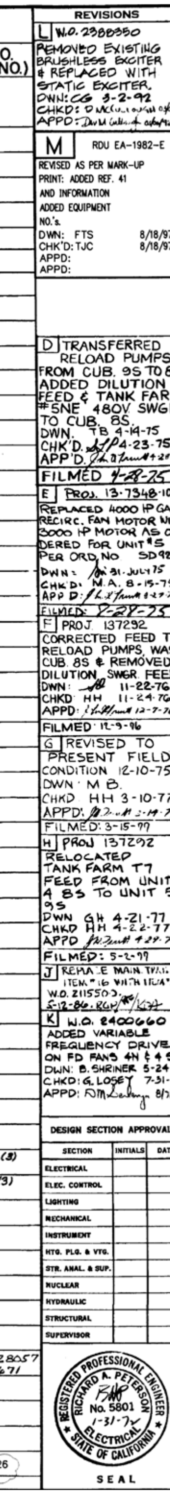
EY072007001SAC Figure_3.1-1h.ai 07/21/2008 tdaus



LIST OF EQUIPMENT

REF. NO.	DESCRIPTION	TYPE & RATING	MFG. DWG. NO. XSD (ORDER NO.)
1	STEAM TURBINE DRIVEN GENERATOR	WEST., 3600RPM, 60Hz, 3Ø, 340,000 KVA @ .9 PF, 306,000 KW, 22 KV, (1890 PSIG @ 950°F & 60 PSIG H2	XSD 8703-23 XSD 8703-1
1A	GENERATOR BUSHING C.T.	WEST, TYPE 10,000/5A METERING & RELAYING	XSD 8703-23,101
1B	GENERATOR FIELD	WEST. 0.102 OHMS @ 75°C, 3352 AMPS, 400V	
	(NOT USED)		
2	EXCITER TRANSFORMER	VIRGINIA TRANSFORMER CORP., 3245KVA, 22,000Δ/576VΔ, SILICON-FILLED, 6.5% IMP.	
3	STATIC EXCITER	A-C SYSTEMS, 3556ADC, 450VDC NOMINAL, AC BREAKER-600VAC, 3200A, SEIMANS TYPE RL3200	
4	(NOT USED)		
5	GENERATOR NEUTRAL GROUNDING TRANS.	G.E. 75 KVA 22,000 - 120/240V, 1Ø	XSD 8804-12
6	GENERATOR NEUTRAL TRANSFORMER SECONDARY LOADING RESISTOR	G.E., CAST GRID, 700A, .19Ω (1MIN. RATING)	XSD 8804-13
7	NEUTRAL BUS CONNECTION	G.E., 6½ DIA. 6 FT. LENGTH	XSD 8804-12
8	GENERATOR MAIN ISOLATED PHASE BUS DUCT	G.E., MINFLUX, 22 KV., 9000A (65°C/40°C RISE) 120,000 A. MOM. 50KV HIPOT 110 KV BIL	XSD 8804-11 & -12
9	ISOLATED PHASE BUS DUCT TAP TO P.T. & SURGE PROTECTION HOUSING	G.E., MINIFLUX, 22 KV, 1200A (65°C/40°C RISE) 120,000 A. MOM. 50KV HIPOT, 110KV BIL	XSD 8804-12
10	ISOLATED PHASE DUCT TAP TO STATION AUX TRANS 4G	G.E., MINIFLUX, 22KV, 1200A (65°C/40°C RISE) 120,000 A MOM, 50KV, HIPOT, 110KV BIL	XSD 8804-11
11	SURGE PROTECTION ARRESTOR	G.E., 24 KV, STATION TYPE, MOD. 9L11LAB024	XSD 8804-12
12	SURGE PROTECTION CAPACITOR	G.E. 24KV, SINGLE POLE, (0.125MFD) MOD 9L18ACH101	XSD 8804-12
13	CURRENT LIMITING POTENTIAL TRANSFORMER FUSES	G.E., TYPE EJ-1	XSD 8804-12
14	POTENTIAL TRANSFORMER	G.E., TYPE JVS-150, 22 KV/120V, 400VA, 60Hz	XSD 8804-12
15	NEUTRAL GROUNDING RESISTOR	WEST., 1.6Ω, 1500A @ 10 SEC., 2400V	XSD 9198-1
16	(NOT USED)		
16A	(NOT USED)		
16B	(NOT USED)		
16C	(NOT USED)		
17	STATION AUX. TRANSFORMER 4-G	FEDERAL PACIFIC, 25/33.3/FUT 41.6 MVA, OA, FA, FUT. FA, 20.9KVΔ HV, 4160/2400 Y LV & TERTIARY	XSD 8818-1
17A	HIGH VOLTAGE BUSHING C.T.	FEDERAL PACIFIC, 1200/5A, MULTI-RATIO	XSD 8818-2
17B	NEUTRAL BUSHING C.T.	FEDERAL PACIFIC, 1200/5A, MULTI-RATIO	XSD 8818-2
18	START-UP TRANSFORMER 4-5B	FEDERAL PACIFIC, 25/33.3/FUT 41.6 MVA, OA, FA, FUT FA, 138KVΔ HV, 4.16KV ZIGZAG LV. & TERT.	XSD 8818-1,3
18A	HIGH VOLTAGE BUSHING C.T.	FEDERAL PACIFIC 1200/5A MULTI-RATIO	XSD 8817-2
18B	NEUTRAL BUSHING C.T.	FEDERAL PACIFIC 1200/5A MULTI-RATIO	XSD 8817-2
18C	LOW VOLTAGE BUSHING C.T.	FEDERAL PACIFIC 3000/5A MULTI-RATIO	XSD 8817-2
18D	HIGH VOLTAGE LIGHTNING ARRESTOR	O.B. CO., STATION CLASS, 120 KV TYPE MPR 120, CAT. - 211332	XSD 8817-1,3
20	AIR CIRCUIT BREAKER 3PST	G.E, TYPE PCB AM 4.16-350, 3000A, 4160V	XSD 9004-4 XSD 9004-5
21	AIR CIRCUIT BREAKER 3PST	G.E., TYPE PCB AM 4.16-250, 1200A, 4160V	XSD 9004-4 XSD 9004-5
22	CURRENT TRANSFORMER	G.E., TYPE 3-JCB0 5000/5A, SINGLE SEC.	XSD 9004-4 XSD 9004-5
23	CURRENT TRANSFORMER	G.E., TYPE 3-JCS0 3000/5A, SINGLE SEC.	XSD 9004-4 XSD 9004-5
24	CURRENT TRANSFORMER	G.E., TYPE 3-JCS0 800/5A, SINGLE SEC.	XSD 9004-4 XSD 9004-5
25	CURRENT TRANSFORMER	G.E., TYPE 3-JKS3 150/5A, SINGLE SEC.	XSD 9004-4 XSD 9004-5
26	CURRENT TRANSFORMER	G.E., TYPE 3-JKS3 75/5A, SINGLE SEC.	XSD 9004-4 XSD 9004-5
27	CURRENT TRANSFORMER	G.E, TYPE 3-JCS0 600/5A, SINGLE SEC.	XSD 9004-4 XSD 9004-5
28	CURRENT TRANSFORMER	G.E., TYPE 3-JCS0 900/5A, SINGLE SEC.	XSD 9004-4 XSD 9004-5
29	CURRENT TRANSFORMER	G.E., RING TYPE, GS, 50/5A	XSD 9004-4 XSD 9004-5
30	POTENTIAL TRANSFORMER	G.E., JVM3, 4200/120V, 60Hz	XSD 9004-4 XSD 9004-5
31	CURRENT LIMITING FUSES	G.E., TYPE OC2	XSD 9004-4 XSD 9004-5
32	5KV BUS DUCT, TRANS 4-G TO UNIT 4 4160V SWGR.	G.E., 5KV, 3000A, 3Ø NON SEGREGATED BUS	XSD 9004-3(1)(2)(3) XSD 9004-2
33	5KV BUS DUCT, TRANS 4-5B TO UNIT 4 4160V SWGR.	G.E., 5KV, 3000A, 3Ø NON SEGREGATED BUS	XSD 9004-3(1)(2)(3) XSD 9004-2
34	5KV BUS DUCT TRANS 4-5B TO UNIT 5 4160V SWGR	G.E. 5KV, 3000A, 3Ø NON SEGREGATED BUS	XSD 9591- XSD 9591-
35	AIR CIRCUIT BREAKER 3PST	G.E. TYPE PCB AM 4.16-250, 1200A, 4160V	XSD 9499-4 XSD 9499-5
36	CURRENT TRANSFORMER	G.E. TYPE 3-JKS3 100/5A, SINGLE SEC.	XSD 9499-4 XSD 9499-5
37	CURRENT TRANSFORMER	G.E. RING TYPE, 60/5A	XSD 9499-4 XSD 9499-5
38	CURRENT TRANSFORMER	G.E. TYPE 3-JCS0 500/5, SINGLE SEC.	XSD 0042
39	AIR CIRCUIT BREAKER 3PST	G.E. TYPE PCB AM 4.16-250, 1250, 1200A, 4160V	XSD 0042
40	POWER TRANSFORMER #4	G.E. 310000 kVA, 60HZ, 65°C RISE, FOA, 138000 GR Y/79674-20900 VOLT Δ	SDG&E PO 8502-28057 CO. S/N LT-980671
40A	TRANSF #4 NEUTRAL CURR. TRANSF.	G.E. 1200/5 AMP. M.R.B.C.T. CAT # 17B2508B	" "
40B	TRANSF #4 H.V. CURR TRANSF	G.E. 2000/5 AMP. M.R.B.C.T. CAT # 11B623BB	" "
40C	TRANSF #4 H.V. LIGHTING ARRESTOR	G.E. 138KV TYPE 9L11THA108	" "
41	NEUTRAL GROUNDING REACTOR	WEST, 25KV, 353 AMP, 4.16 OHMS	SDG&E H9-53326



REVISED FIGURE 3.1-1I
ONE-LINE DIAGRAM
ENCINA POWER STATION UNIT 4
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

Source: Shaw Stone & Webster, Inc., 2008

EY072007001SAC Figure_3.1-1i 07/21/2008 tdaus

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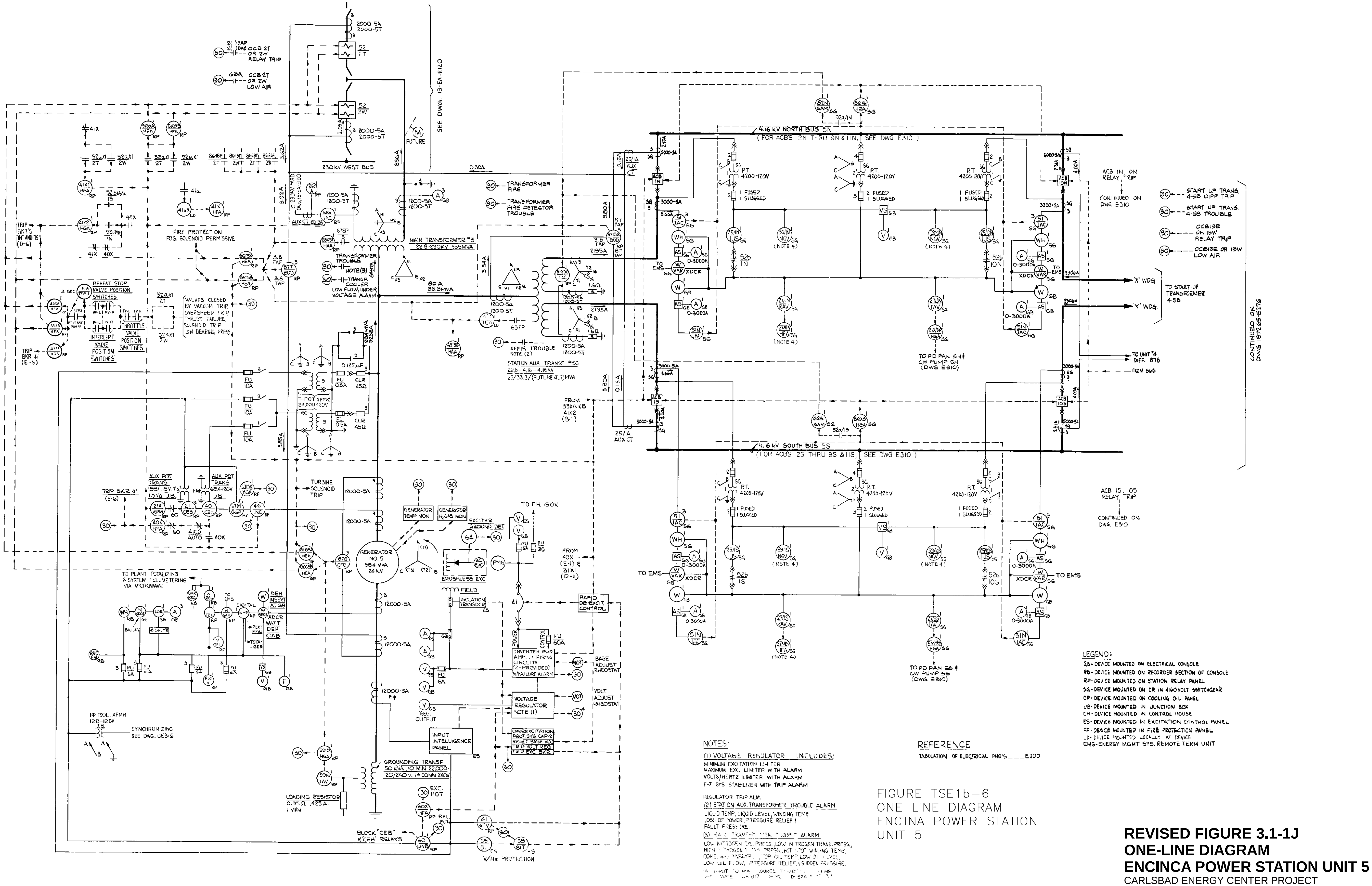
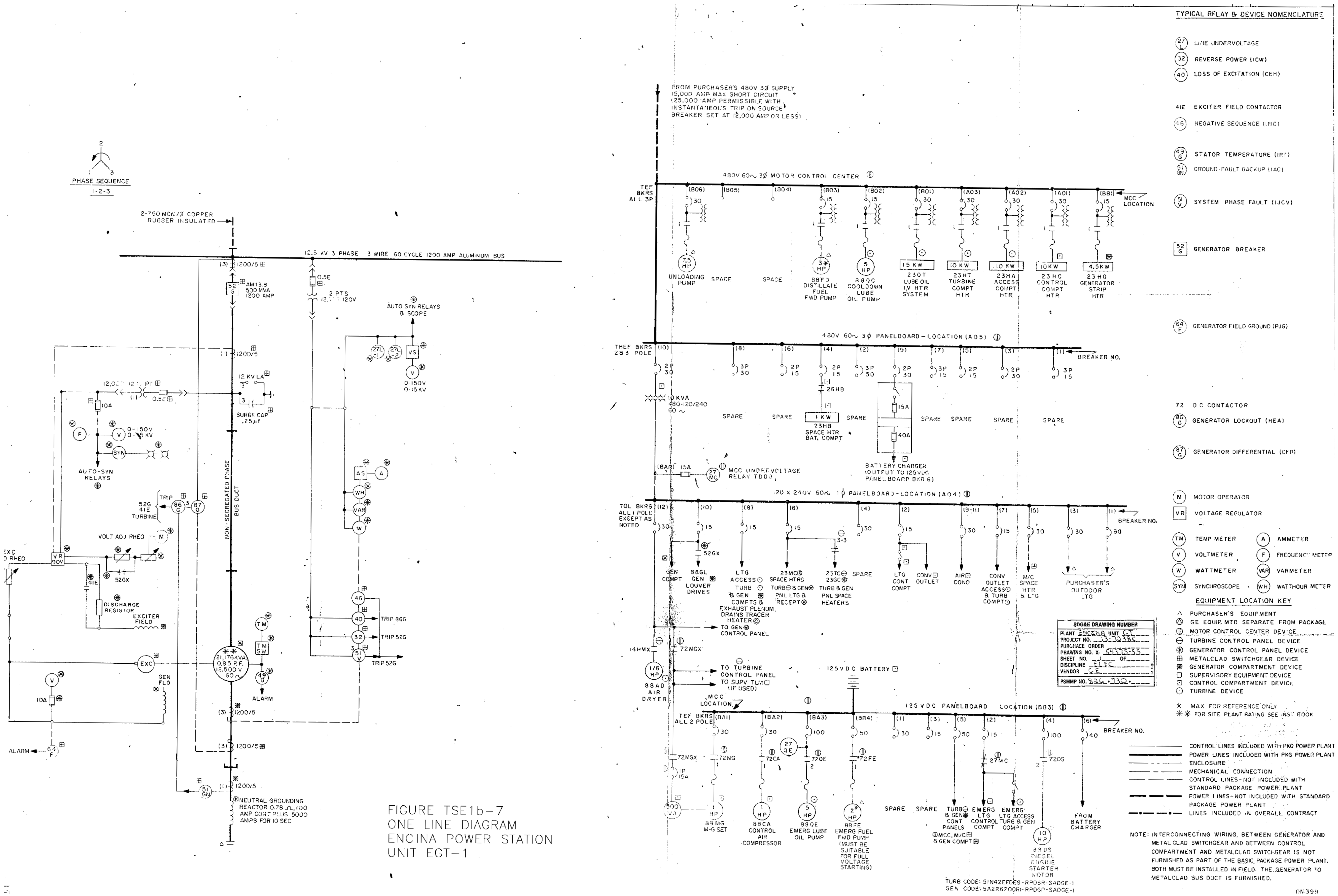


REVISED FIGURE 3.1-1J
ONE-LINE DIAGRAM
ENCINCA POWER STATION UNIT 5
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

Source: Shaw Stone & Webster, Inc., 2008

CH2MHILL

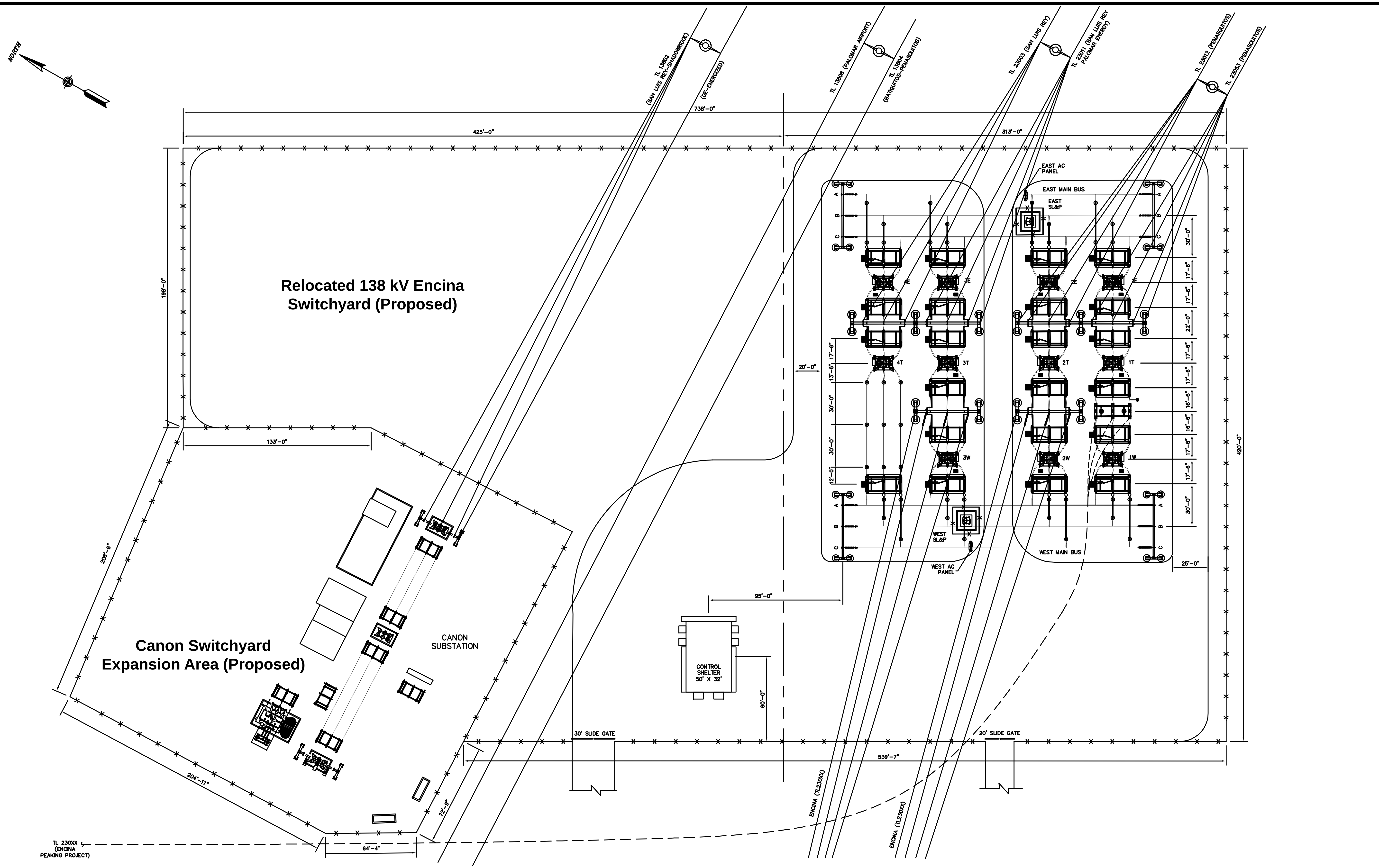
EY072007001SAC Figure_3.1-1j.ai 07/21/2008 tdaus



Source: Shaw Stone & Webster, Inc., 2008

REVISED FIGURE 3.1-1K
ONE-LINE DIAGRAM
ENCINCA POWER STATION
UNIT EGT-1
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

EY072007001SAC Figure_3.1-1k.ai 07/21/2008 tdaus



Source: Shaw Stone & Webster, Inc., 2008

NEW FIGURE 3.1-2
ENCINA EAST SUBSTATION
GENERAL ARRANGEMENT
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

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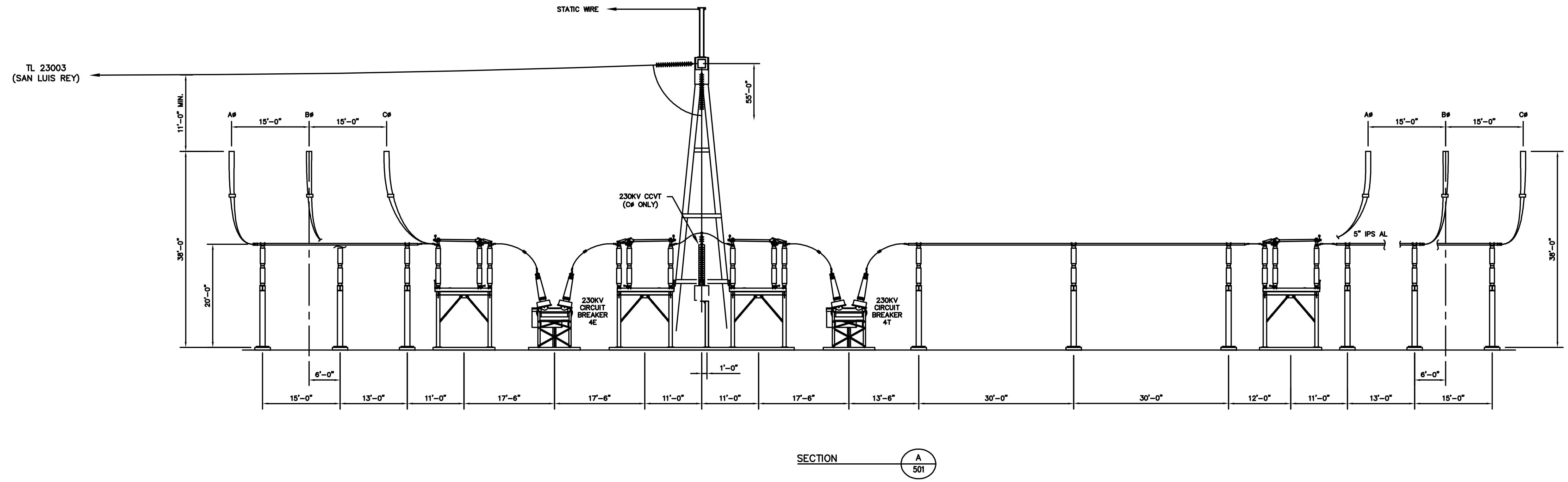
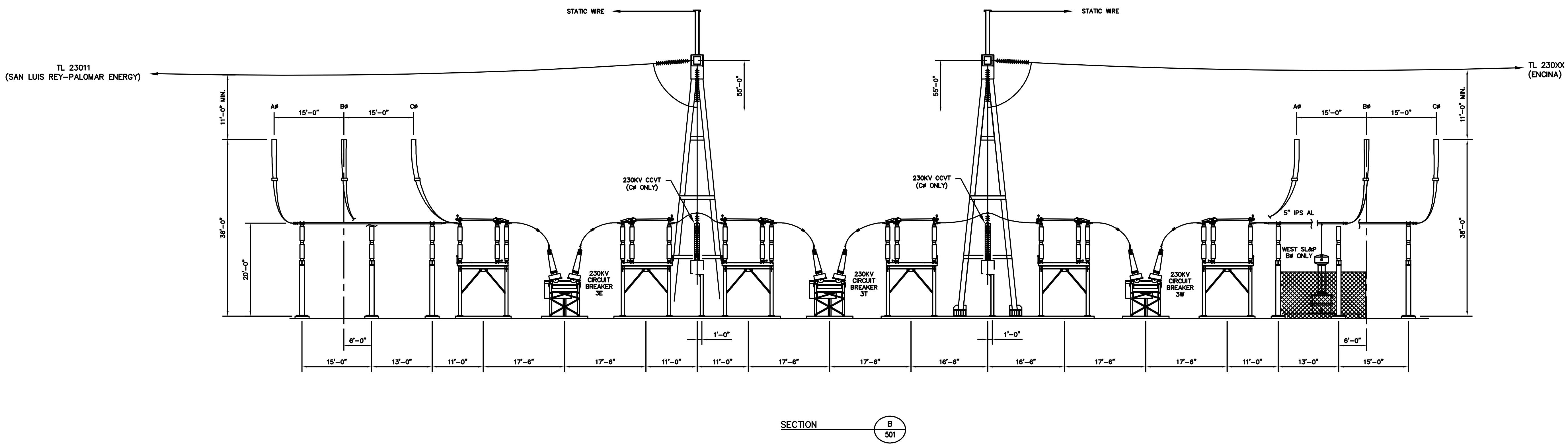
EY072007001SAC Figure_3.1-2.ai 07/21/2008 tdaus





Source: Shaw Stone & Webster, Inc., 2008

FIGURE 3.1-3
ENCINA EAST SUBSTATION
SECTIONS A & B
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

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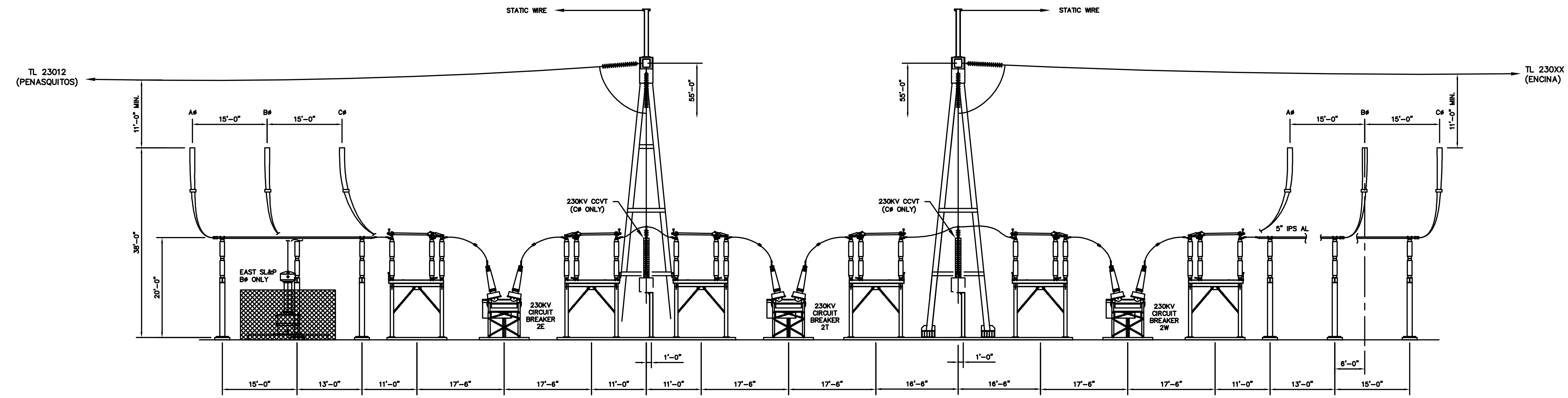
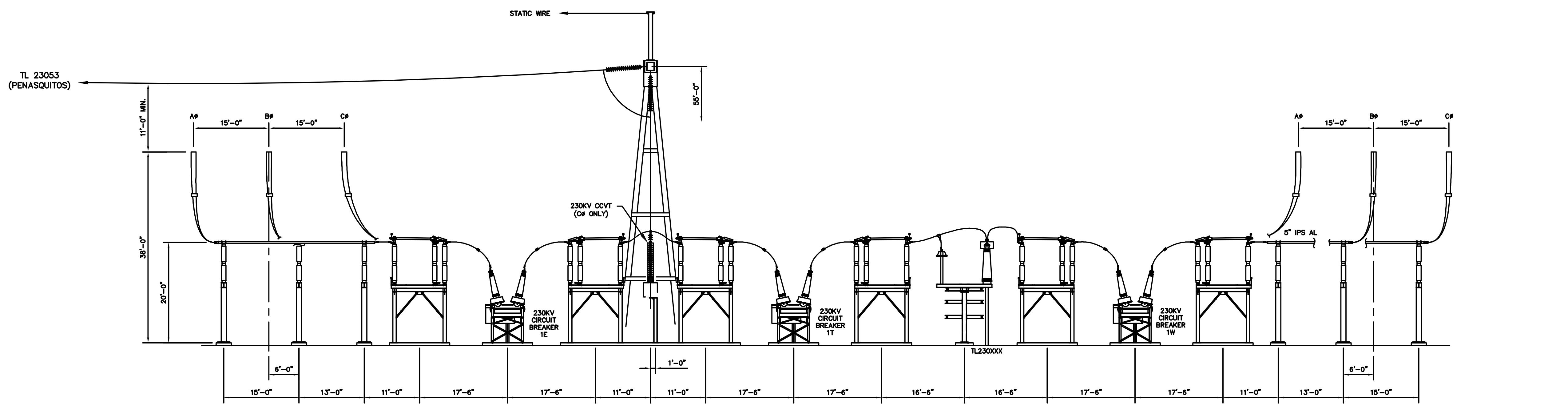
EY072007001SAC Figure_3.1-3.ai 07/24/2008 tdaus



SECTION C 502



SECTION D 502

FIGURE 3.1-4
ENCINA EAST SUBSTATION
SECTIONS C & D
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

Source: Shaw Stone & Webster, Inc., 2008

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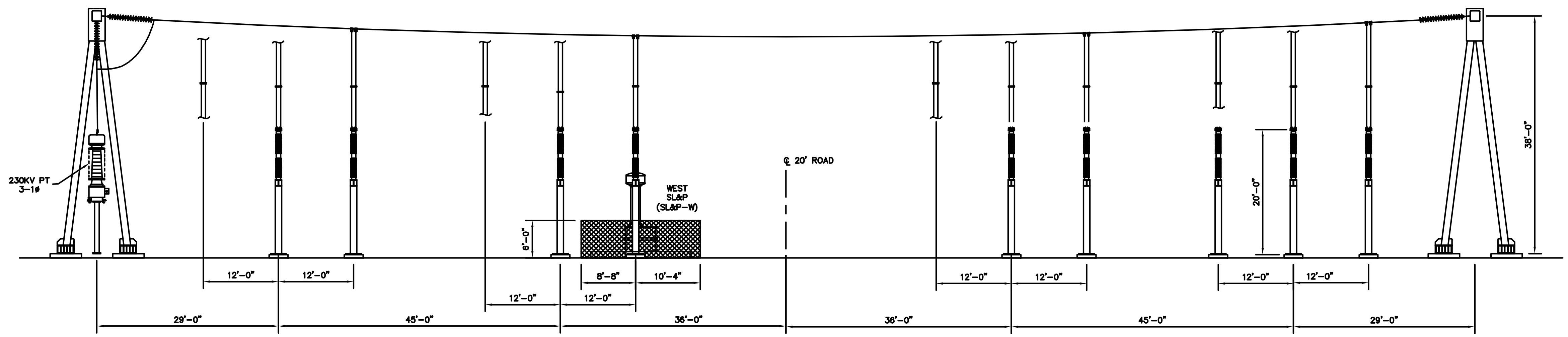
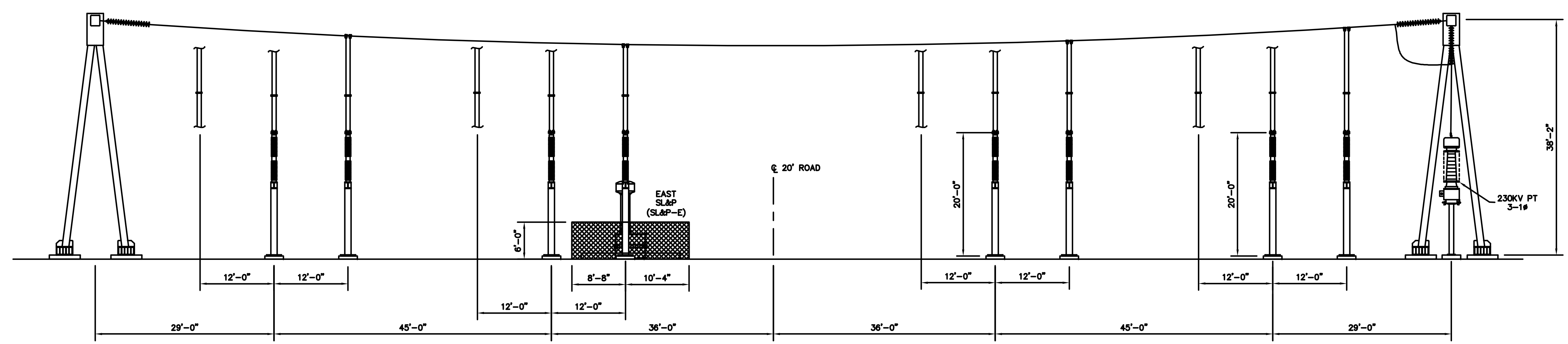
EY072007001SAC Figure_3.1-4.ai 07/21/2008 tdaus



ELEVATION E/501



ELEVATION F/501

Source: Shaw Stone & Webster, Inc., 2008

FIGURE 3.1-5
ENCINA EAST SUBSTATION
SECTIONS E & F
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

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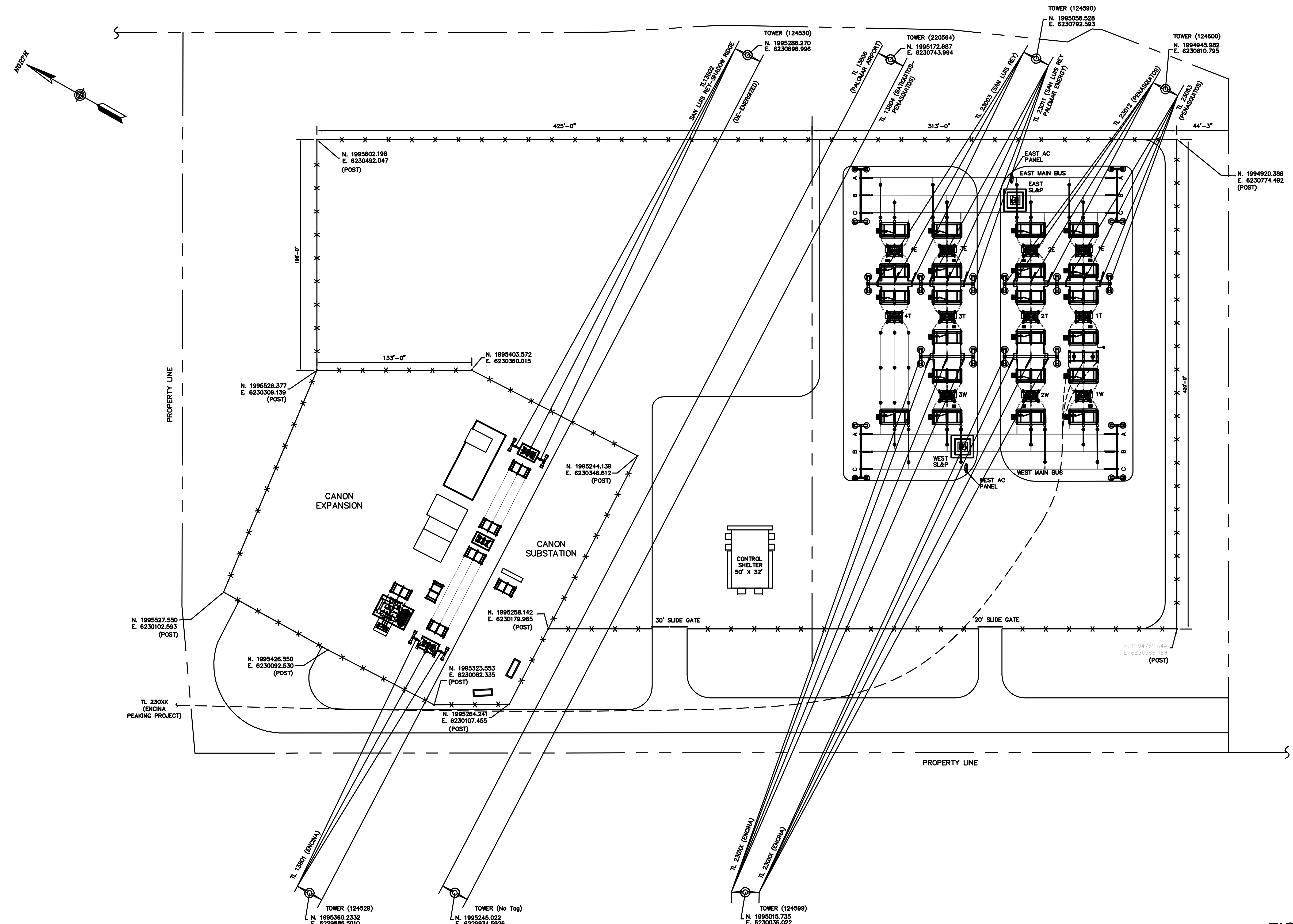
EY072007001SAC Figure_3.1-5.ai 07/21/2008 tdaus



Source: Shaw Stone & Webster, Inc., 2008

FIGURE 3.1-6
ENCINA EAST SUBSTATION TRANSMISSION GENERAL ARRANGEMENT
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

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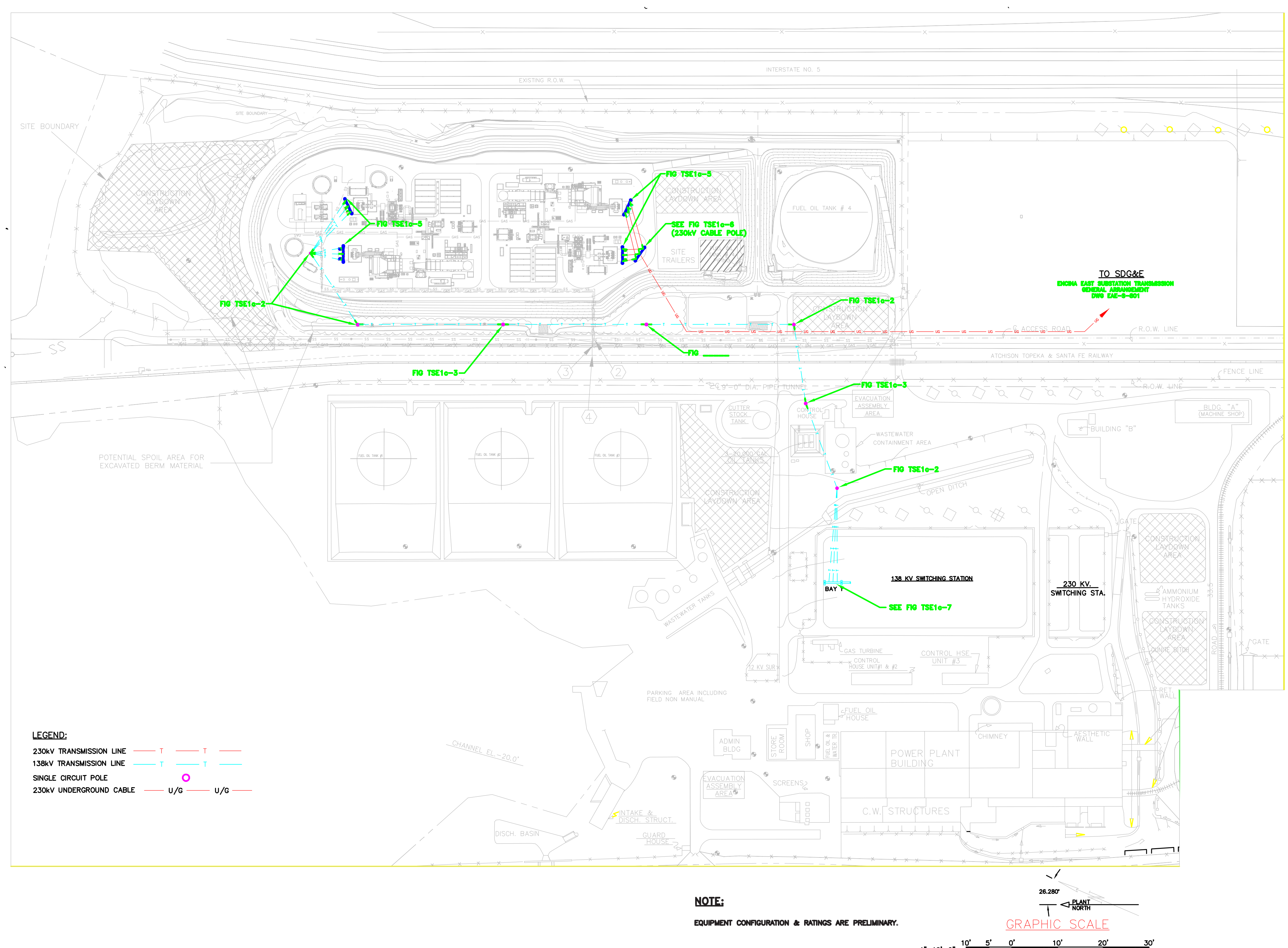
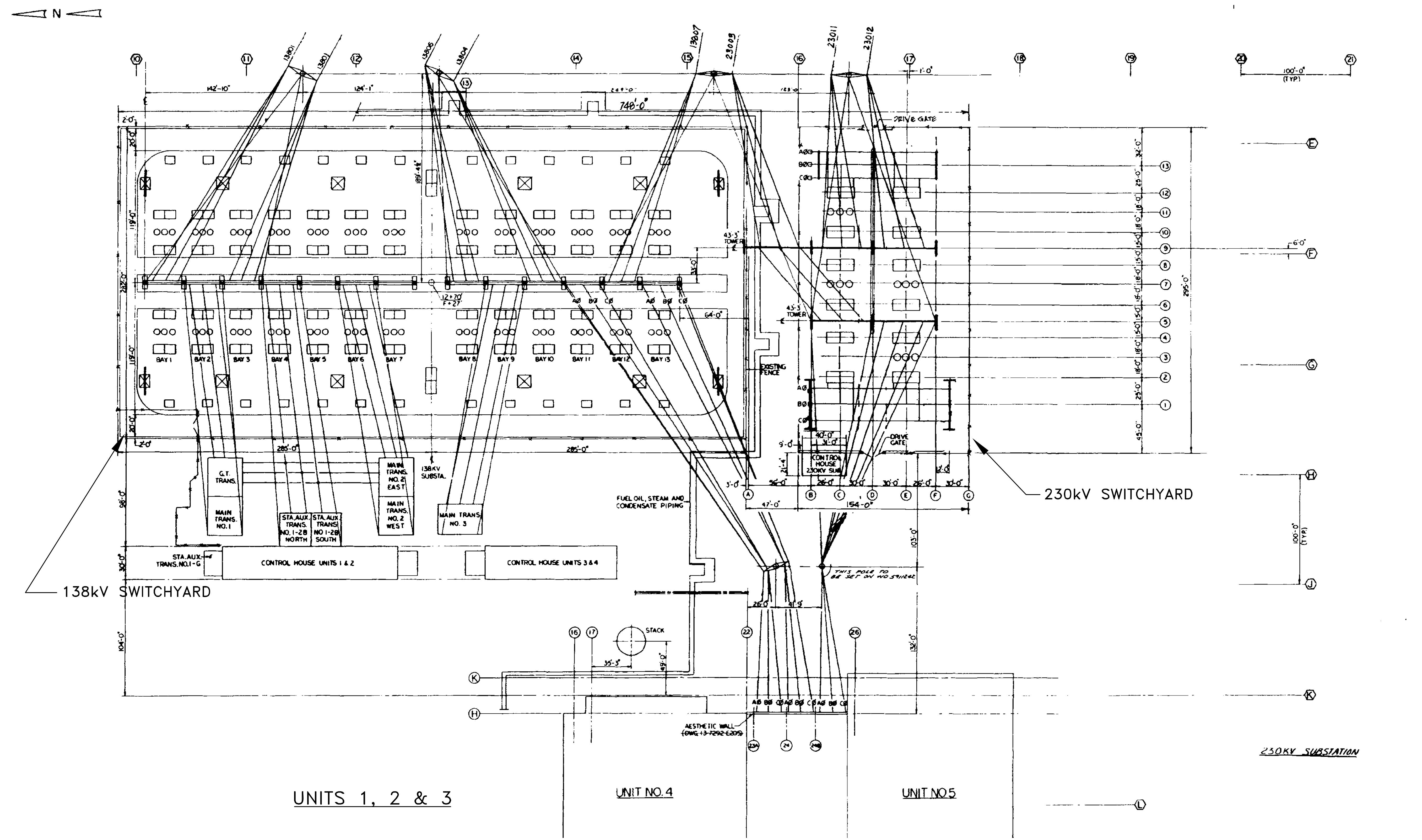


Source: Shaw Stone & Webster, Inc., 2008

FIGURE 3.1-7
ENCINA POWER STATION TRANSMISSION LINE ROUTES
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

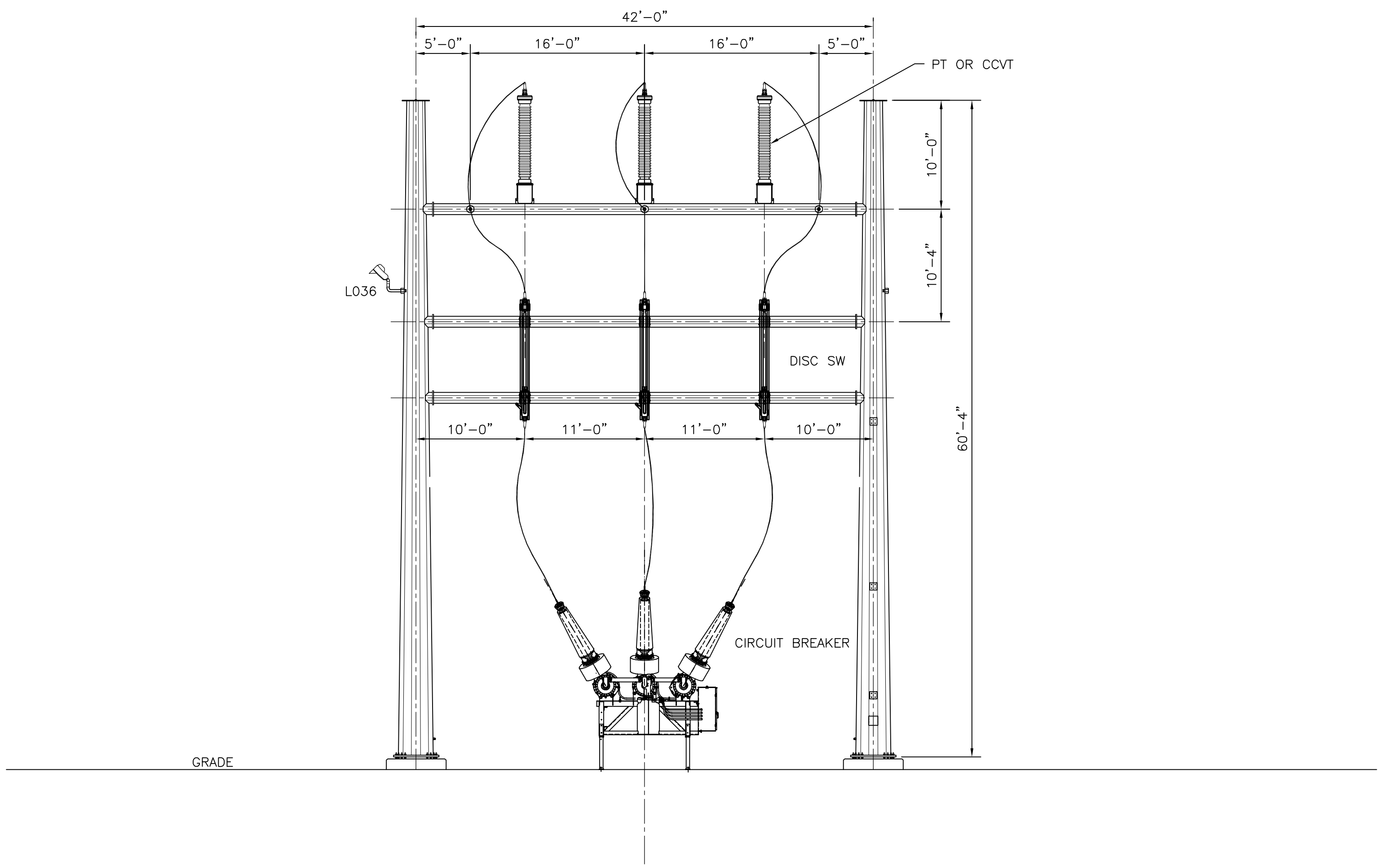
CH2MHILL



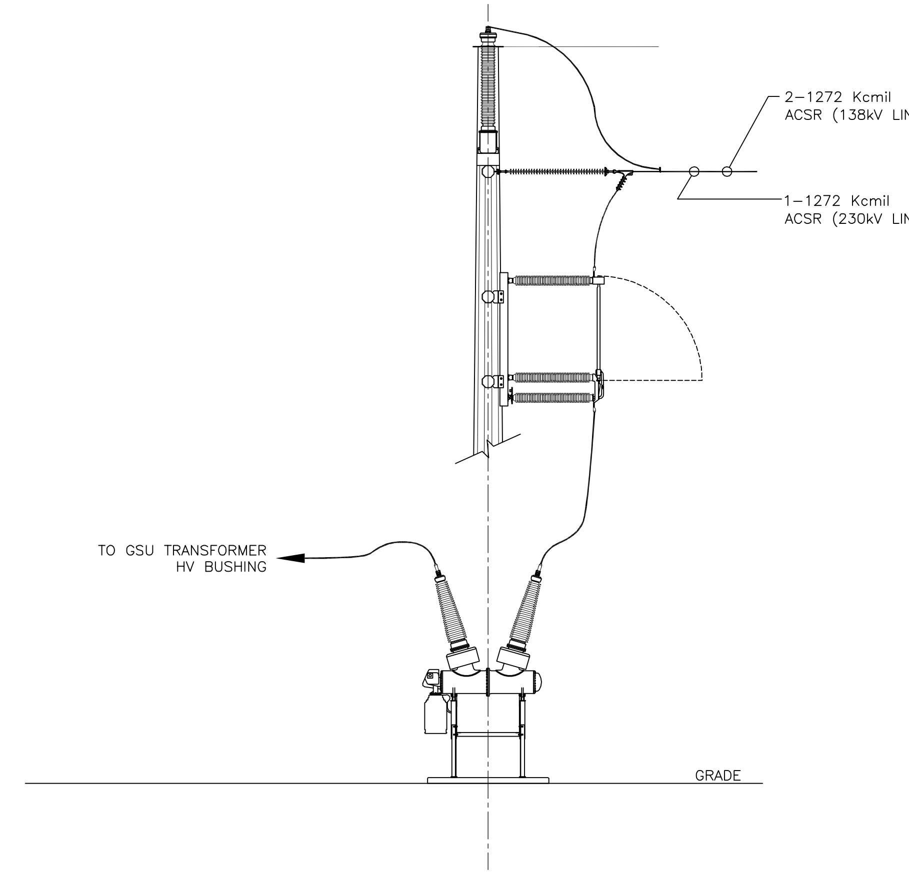
Source: Shaw Stone & Webster, Inc., 2008

FIGURE 3.1-8
ENCINA SUBSTATION 230kV & 138kV GENERAL ARRANGEMENT
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

CH2MHILL



ELEVATION
SCALE: 1/8"=1'-0"



SECTION
SCALE: 1/8"=1'-0"

NOTE:

EQUIPMENT CONFIGURATION & RATINGS ARE PRELIMINARY.

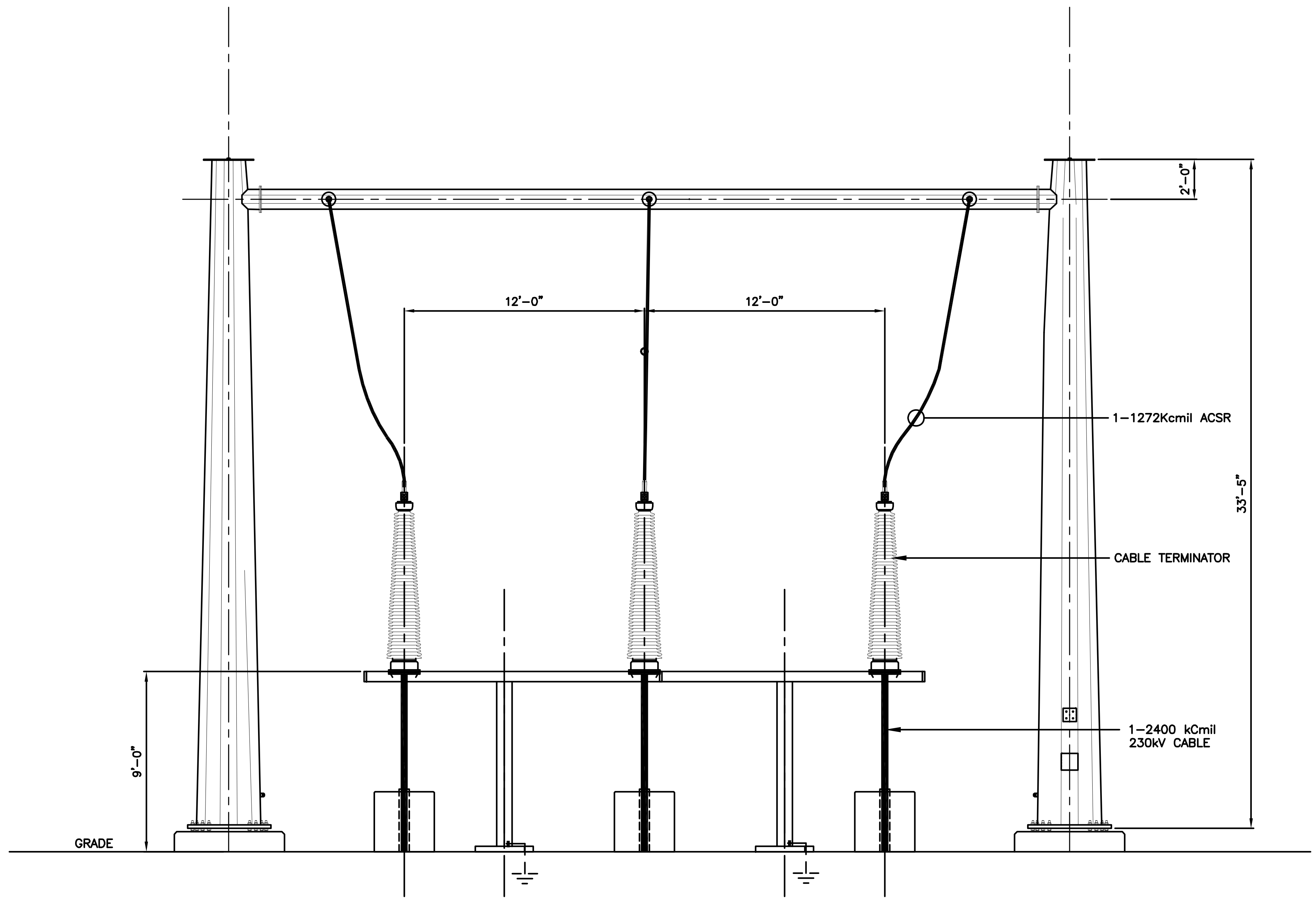
230kV TAKEOFF STRUCTURE

138kV TAKEOFF STRUCTURE (SIMILAR)

Source: Shaw Stone & Webster, Inc., 2008

NEW FIGURE 3.2-2
230kV & 138kV TAKEOFF STRUCTURE
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

CH2MHILL



230KV CABLE RISER STRUCTURE

SCALE: $\frac{1}{4}$"=1'-0"

NOTE:

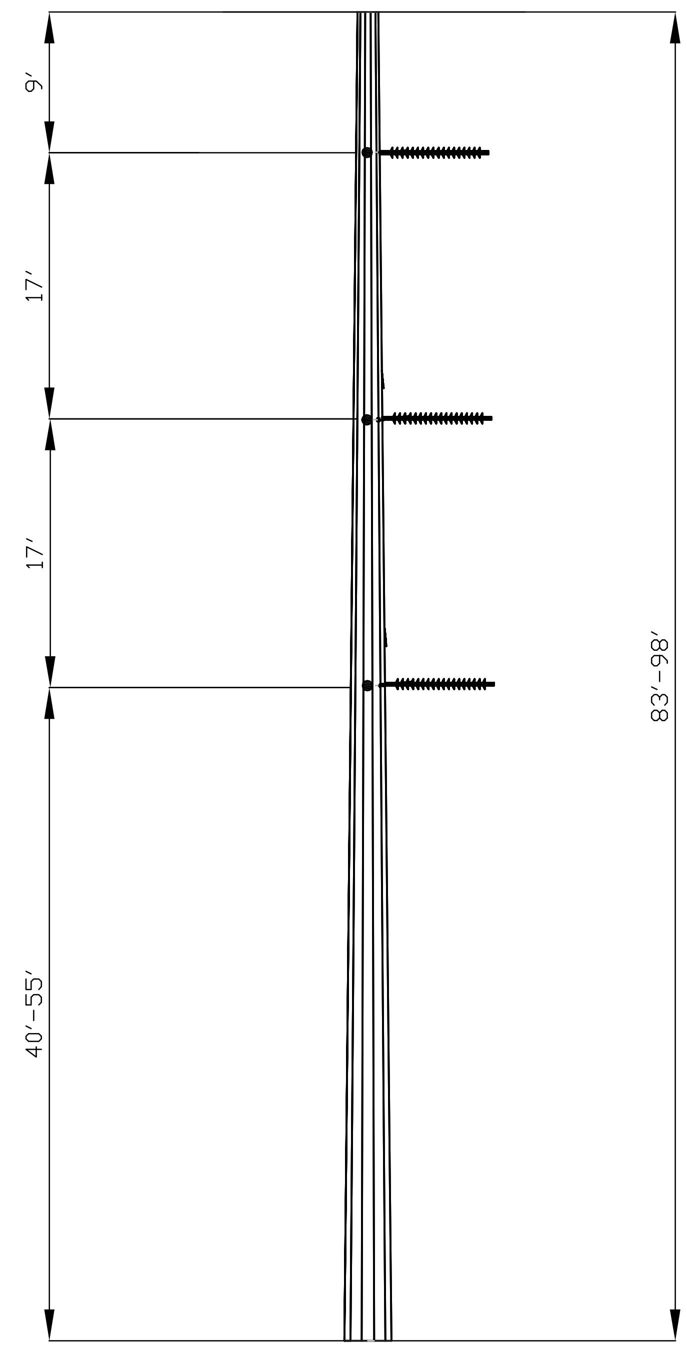
EQUIPMENT CONFIGURATION & RATINGS ARE PRELIMINARY.

Source: Shaw Stone & Webster, Inc., 2008

NEW FIGURE 3.2-3
ENCINA POWER STATION 230kV CABLE RISER
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

CH2MHILL

EY072007001SAC Figure_3.2-3.ai 07/21/2008 tdaus



Source: Shaw Stone & Webster, Inc., 2008

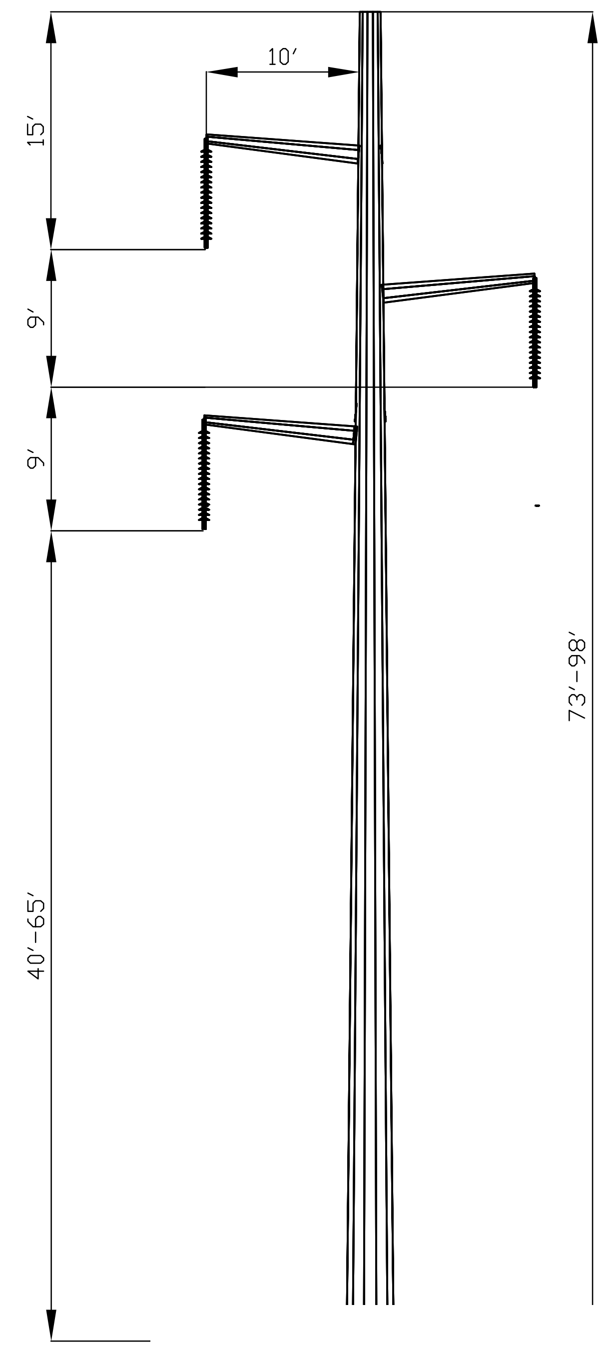
NOTE:

EQUIPMENT CONFIGURATION & RATINGS ARE PRELIMINARY.

NEW FIGURE 3.2-4
138kV LINE POLE
CROSS-SECTION DEADEND POLE
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

CH2MHILL

EY072007001SAC Figure_3.2-4.ai 07/21/2008 tdaus



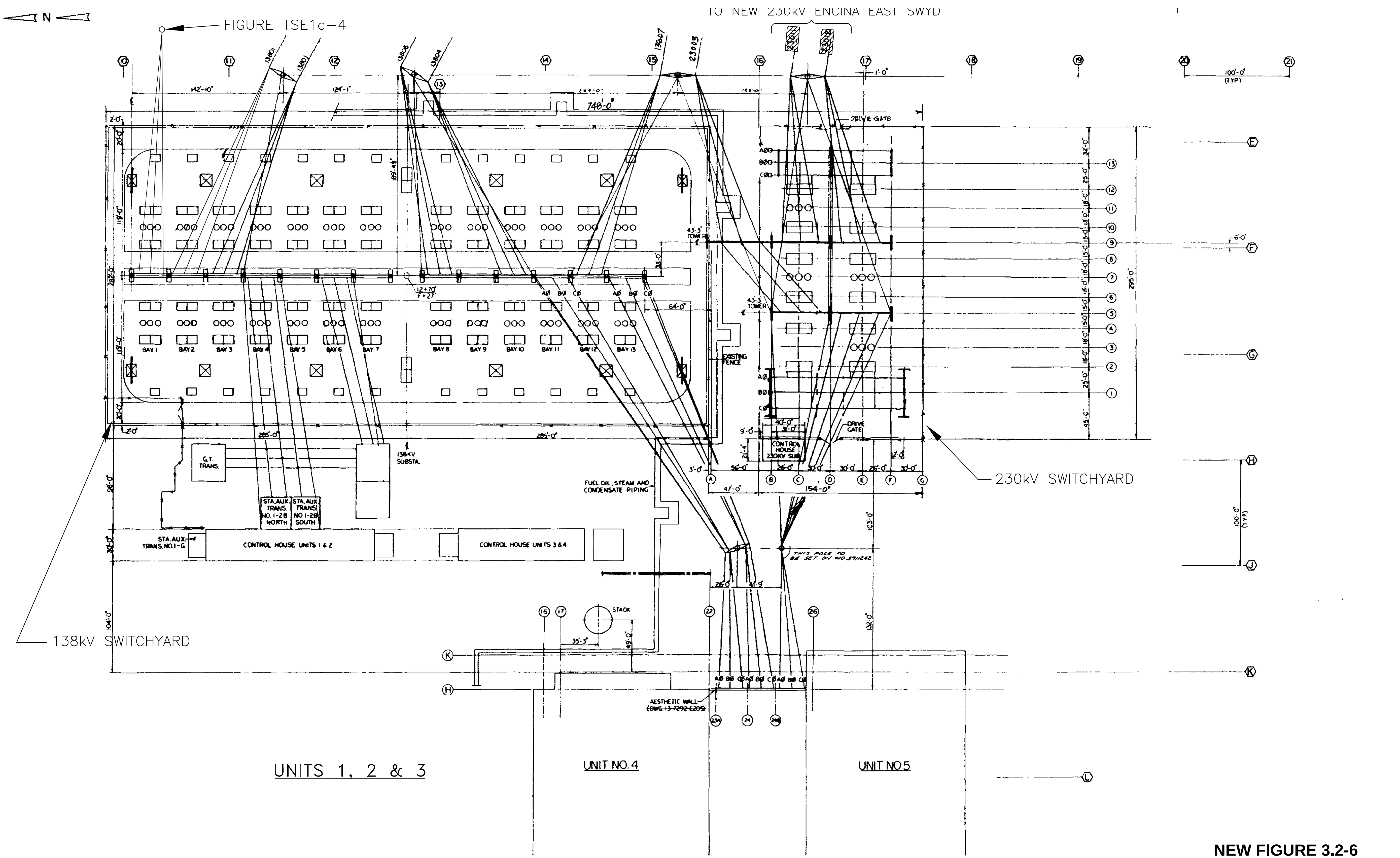
NOTE:

EQUIPMENT CONFIGURATION & RATINGS ARE PRELIMINARY.

Source: Shaw Stone & Webster, Inc., 2008

NEW FIGURE 3.2-5
138kV LINE POLE
CROSS-SECTION TANGENT POLE
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

CH2MHILL



NEW FIGURE 3.2-6
ENCINA SUBSTATION
230kV & 138kV GENERAL ARRANGEMENT

CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

Source: Shaw Stone & Webster, Inc., 2008

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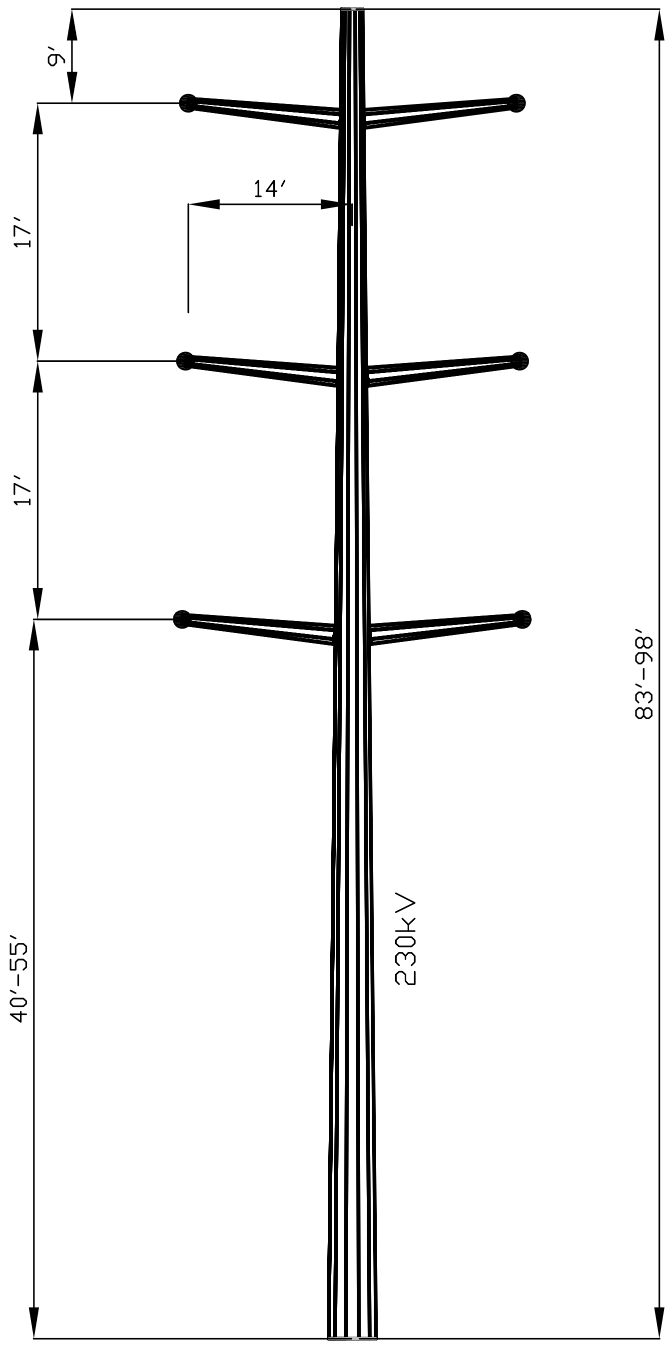
EY072007001SAC Figure_3.2-6.ai 07/21/2008 tdaus



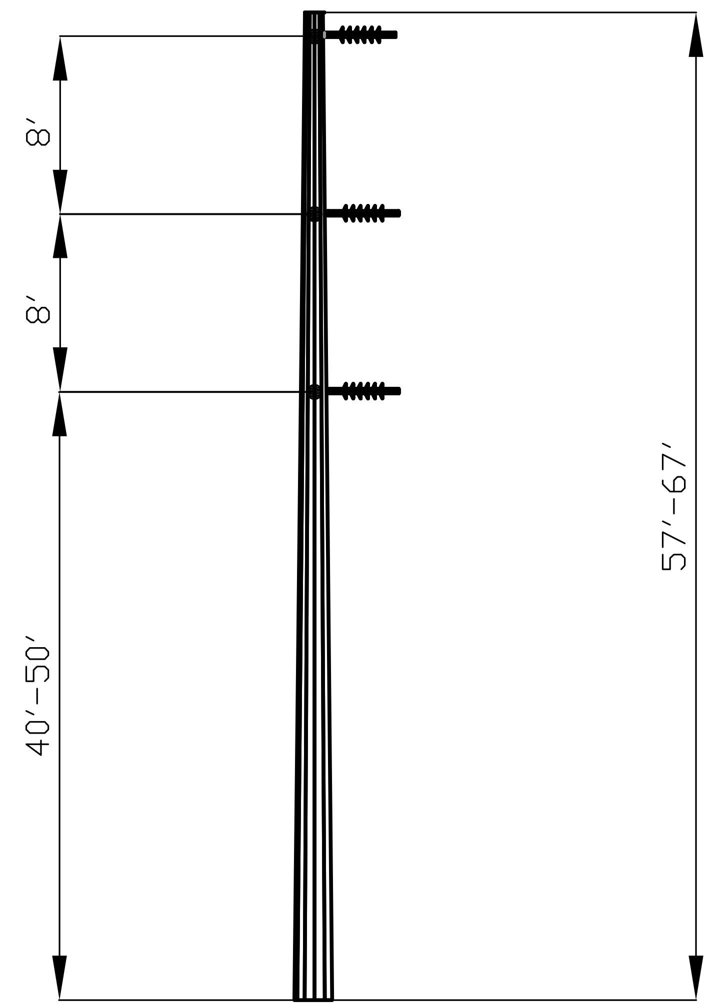
NOTE:

EQUIPMENT CONFIGURATION & RATINGS ARE PRELIMINARY.

NEW FIGURE 3.2-7
138 & 230kV LINE POLE CROSS-SECTION
DOUBLE CIRCUIT DEADEND
CONFIGURATION LINE DIVERGENCE POINT
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

Source: Shaw Stone & Webster, Inc., 2008

CH2MHILL



NOTE:

EQUIPMENT CONFIGURATION & RATINGS ARE PRELIMINARY.

Source: Shaw Stone & Webster, Inc., 2008

NEW FIGURE 3.3-6
138kV LINE POLE
CROSS-SECTION SINGLE
CIRCUIT TO 138kV SUBSTATION
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CA

CH2MHILL

EY072007001SAC Figure_3.3-6.ai 07/21/2008 tdaus

Natural Gas Supply

The project enhancements and refinements do not have any affect on the natural gas supply for the overall CECP, nor on the volume of natural gas that will be required by the project. Therefore, the discussion of natural gas supply in Section 4.0 of the AFC remains applicable for the project.

Environmental Analysis of Proposed Change to the Project Description

The project enhancements and refinements do not affect most of the environmental analyses described in the AFC. An analysis of the effects of project enhancements and refinements on each of the environmental areas is presented below. In addition, LORS contained in the AFC have been reviewed to determine if any LORS should be added or removed from the analysis as a result the project enhancements and refinements.

5.1 Air Quality

5.1.1 Introduction

While the project enhancements and refinements do not affect most of the environmental analyses described in the September 2007 AFC, the increase in the stack height from 100 to 139 feet requires an updated air quality impact analysis. The refinement of the stack height is proposed primarily to resolve the issue initially raised by the CEC staff in Data Request Set Number 1 (i.e., Data Request Numbers 22, 23, and 24) regarding possible complications during air emission compliance tests due to the proposed 100-foot stack height. In Data Request Set Number 2A (i.e., Data Request Number 118), the CEC staff requested a final resolution to this issue. As discussed in Data Response 118 (Data Response Set 2A), the increase in stack height to 139 feet provides a greater distance between major exhaust flow disturbances and compliance test sample ports. With a stack height of 139 feet, the requirements of USEPA Method 1 for two-stack diameters downstream and one-half-stack diameter upstream of flow disturbances are met (40 CFR 60, Appendix A, Method 1, Section 1.2). A monitoring plan is being prepared for the stack height of 139 feet, and this document will be submitted to the SDAPCD and docketed with the CEC.

No changes in the air emissions and/or operation of the CECP are being proposed as part of the project enhancements and refinements. Therefore, only changes associated with the ambient air quality impact modeling analyses are expected. A revised modeling analysis was performed to determine the effect of the refined stack height of 139 feet on modeled ambient impacts. The following subsections describe the revised ambient impact analyses results and the evaluation of compliance with ambient air quality standards.

There are no changes to the air quality and air emission LORS included in the AFC due to the inclusion of the project enhancements and refinements in the CECP. See the AFC for the complete evaluation of the CECP compliance with applicable air quality and air emission LORS.

5.1.2 Air Quality Impact Analysis

5.1.2.1 Modeling Methodology for Evaluating Impacts on Ambient Air Quality

A revised air quality modeling analysis was performed for the project in response to CEC Data Request Numbers 84, 85, 87, 89, and 90. The revised modeling includes the following updates:

- The project site elevation has been corrected to 30 feet above mean sea level rather than the 44 feet above mean sea level used for the previous modeling (see Data Request Number 84).
- The berms are now treated as a series of structures surrounding the project site rather than treated as a plateau covering the project site (see Data Request Number 85).
- A particulate matter less than 10 micrometers in diameter (PM_{10}) emission rate of 9.5 pounds per hour is used for the gas turbines rather than the 10 pounds per hour used for the previous modeling (see Data Request Number 89).
- The meteorological surface parameters (i.e., surface roughness, albedo and Bowen Ratio) were revised based on information provided by the SDAPCD in March 2008.
- Some minor corrections to project area background PM_{10} levels were made based on information provided by the SDAPCD in February 2008.

In addition to the above updates, the revised modeling includes the increase in the stack height from 100 to 139 feet.[2] This refinement was made in response to Data Request Number 118 in which the CEC requested a final resolution to the compliance test sample port issue. Other than this refinement in stack height, the revised modeling methodology (e.g., dispersion model used, model options, meteorological data, background data, and building downwash characteristics) is identical to the methodology used in the September 2007 AFC for the project.

5.1.2.2 Results Compared to the Ambient Air Quality Standards

Revised Construction Emissions and Air Quality Impact Analysis. In the September 2007 AFC for CECP, the air quality impacts associated with the construction phase of the project were analyzed. For this analysis in the AFC, the construction schedule ranged from 19 to approximately 25 months, depending on the stages between installing each of the two units. Maximum air quality impacts were expected to occur with the 19-month schedule due to the higher concentration of construction equipment on a daily, monthly, and annual basis. Consequently, the 19-month construction schedule was analyzed for the September 2007 AFC.

The project enhancements and refinements for the CECP will include the construction of an ocean-water purification system, construction of a new SDG&E 230-kV switchyard, and the demolition of fuel-oil Tanks 5, 6, and 7 along with any resulting soil remediation. The addition of these project enhancements and refinements will result in a revised overall construction schedule for CECP. To determine if the revised project construction schedule

[2] As part of the increase in stack height, the inside stack diameter has increased from 20 to 21.3 feet.

will result in any new significant air quality impacts, the maximum daily and annual emissions were calculated for the new construction schedule. The detailed emission calculations for the revised construction schedule are included in Revised Appendix 5.1E. In the following tables, the maximum daily and annual emissions for the revised construction schedule are compared to the construction emissions analyzed in the September 2007 AFC. As shown on Revised Tables 5.1-1 and 5.1-2, the maximum daily emissions and annual emissions for the revised construction schedule are lower then the levels analyzed in the AFC. Consequently, no new significant air quality impacts are expected for the revised construction schedule.

REVISED TABLE 5.1-1
Maximum Daily Emissions During Construction (Pounds Per Day)

	NO_x	CO	VOC	SO_x	PM_{10}	$PM_{2.5}$
Construction Analysis in AFC						
Onsite Emissions (Construction Equipment, Fugitive Dust)	386.6	220.0	35.5	0.4	58.2	24.1
Offsite Emissions (Worker Travel, Truck, Rail Deliveries)	218.8	379.2	42.6	0.4	9.5	9.5
Total	605.4	599.2	78.1	0.8	67.7	33.6
Revised Construction Schedule						
Onsite Emissions (Construction Equipment, Fugitive Dust)	274.9	150.3	25.2	0.3	42.2	17.6
Offsite Emissions (Worker Travel, Truck, Rail Deliveries)	218.8	379.2	42.6	0.4	9.5	9.5
Total	493.7	529.5	67.8	0.7	51.7	27.1

REVISED TABLE 5.1-2
Peak Annual Emissions During Project Construction (Tons Per Year)

	NO_x	CO	VOC	SO_x	PM_{10}	$PM_{2.5}$
Construction Analysis in AFC						
Onsite Emissions (Construction Equipment Fugitive Dust)	18.0	15.3	1.9	0.0	3.6	1.3
Offsite Emissions (Worker Travel, Truck, Rail Deliveries)	11.0	31.7	3.3	0.0	0.5	0.5
Total	29.0	47.0	5.2	0.0	4.1	1.8
Revised Construction Schedule						
Onsite Emissions (Construction Equipment Fugitive Dust)	16.9	13.3	1.7	0.0	3.2	1.2
Offsite Emissions (Worker Travel, Truck, Rail Deliveries)	9.7	31.6	3.3	0.0	0.5	0.5
Total	26.6	44.9	5.0	0.0	3.7	1.7

Commissioning Impacts Analysis. The revised modeled impacts during commissioning activities are shown in the Revised Table 5.1-28 (see New Appendix 5.1G). The revised results are shown in strikethrough/underline format. As shown in Table 5.1-28, there are only minor changes to the modeling results during commissioning activities due to the increase in stack height. Revised Table 5.1-30 combines The maximum modeled impacts with the maximum background ambient levels and compares these levels with the state and federal ambient air quality standards (see New Appendix 5.1G). As shown in Table 5.1-30, the revised modeling results do not indicate any new significant air quality impacts. The input and output modeling files for the commissioning phase of the project are included in the enclosed compact disc.

Operation Impacts Analysis (Including Gas Turbine Startups/Shutdowns). The revised modeled impacts during normal equipment operation (including gas turbine startups/shutdowns) are shown in the enclosed Revised Tables 5.1-27, 5.1-30, and 5.1-31 (see New Appendix 5.1G). The revised results are shown in strikethrough/underline format. As shown on these tables, there are only minor changes to the modeling results during normal equipment operation due to the proposed change to the stack height. Revised Table 5.1-30 combines the maximum modeled impacts with the maximum background ambient levels and compares these levels with the state and federal ambient air quality standards. As shown on Revised Table 5.1-30, the revised modeling results do not indicate any new significant air quality impacts. The input and output modeling files for normal equipment operation are included in the enclosed compact disc.

5.2 Biological Resources

5.2.1 Introduction

While the project enhancements and refinements do not affect some of the environmental analyses described in the AFC, the consideration of an ocean-water purification system as an option for providing industrial water for CECP could potentially affect the results of the biological resources impact analysis. The following subsections describe the revised biological resources impact analysis.

The option of adding the ocean-water purification system to the CECP for delivery of purified industrial water was evaluated for potential impacts on marine habitats in the vicinity of the EPS. Once the CECP is in operation, EPS Generating Units 1, 2, and 3 will be retired, thereby reducing the volume of seawater used for once-through cooling at the EPS by 224.64 mgd. The 4.32-mgd volume of seawater required for ocean-water purification will result in a substantial reduction in impingement and entrainment effects, which have been extensively studied for the existing EPS units. Results from entrainment and impingement studies on the potential effects of the existing EPS units showed that withdrawal of cooling water does not appear to have affected adult fish populations in Agua Hedionda Lagoon (AHL). The potential for impacts when EPS Generating Units 1, 2, and 3 are retired will be even less.

The operation of the ocean-water purification system for CECP will pump a maximum of 4.32 mgd of ocean water on a peak day from the existing EPS intake conduits. The limited potential for impacts due to the operation of the ocean-water purification system were examined by analyzing data previously collected from extensive studies on the effects of the intake and discharge for the EPS and the Carlsbad Seawater Desalination Plant (CSDP). The analysis showed that the intake of 4.32 mgd for the project represented very little risk to marine organisms from entrainment and presented no risk from impingement due to the low intake approach velocities. The small fraction of marine organisms potentially lost due to CECP entrainment would have no effect on these populations. Even current intake volumes do not appear to have affected resident populations of fishes in AHL such as gobies—the group of fishes with the highest estimated entrainment effects—which are found in densities in AHL similar to nearby lagoons that do not have power plants. Similarly, modeling of the small volume discharge from the operation of the ocean-water purification system showed that elevated salinities would only occur in a limited area around the point of discharge and at levels that will be well below the tolerance levels of the marine organisms found in the area.

5.2.2 Laws, Ordinances, Regulations, and Standards

The federal, state, and local LORS applicable to biological resources and conformance are generally the same as described in the Section 5.2 of the AFC, with the exception of the addition of the California Ocean Plan (Ocean Plan) and other applicable sections of the California Water Code (CWC), which are described below. These LORS are related to the use of purified ocean water to provide industrial water for the CECP. For a complete description of the applicable LORS, refer to the CECP AFC.

The CWC requires the State Water Resources Control Board to formulate and adopt a water quality control plan for the ocean waters of the state known as the California Ocean Plan. The Ocean Plan establishes water quality objectives to protect the beneficial uses of California's ocean waters and is applicable to all ocean/coastal discharges. The State Water Resources Control Board adopted the Ocean Plan in 1972 and has since periodically revised the Plan, most recently in 2007.

The Ocean Plan does not establish water quality objectives for the thermal component of ocean discharges; rather it incorporates by reference the objectives defined in the Thermal Plan. In establishing receiving water quality objectives, the Ocean Plan provides guidelines for defining the physical dispersion zone (zone of initial dilution) for point source discharges. With regard to its application in establishing discharge limits, the dispersion zone is conceptually equivalent to the mixing zone described in federal water quality regulations. The mixing zone is used to delimit an allowable area within which water quality objectives for the receiving water are not expected to be met. Within the mixing zone it would be expected that chronic effects to some marine life would occur as a change in community composition, but acute mortality on organisms passing through the zone would not occur. At the edge of the mixing zone and beyond, no chronic effects on the biota are allowed.

5.2.3 Affected Environment

Section 5.2 of the AFC focused primarily on the terrestrial biological conditions of the CECP site. Changes to the biological resources analysis have occurred as a result of the inclusion of the ocean-water purification system for CECP industrial water. A description of the biological conditions of the marine environment—beginning with a regional overview, the communities and habitat present in the affected area, and a discussion of specific special-status species known to occur in the general region—is provided below. In the following description of the environmental setting, the physical environment is characterized in terms of water body currents and tidal volumes relevant to the analysis of entrainment impacts, and the biological characteristics are generally described with reference to previous environmental studies done for the existing operations of the EPS.

5.2.3.1 Regional Overview

The aquatic environment surrounding the EPS and the CECP site consists of the AHL and its seasonal tributaries and the open coastal waters of the Southern California Bight (SCB) of the eastern Pacific Ocean. The SCB extends along approximately 480 kilometers (km) (350 miles) of coastline and is generally delineated by Point Conception to the north, Point Colnett in Baja California to the south, and inshore of the Santa Rosa Cortez Ridge, including the California Channel Islands (a width of approximately 160 km (100 miles). It includes portions of the continental shelf and a network of deep sea basins close to shore.

The circulation of the SCB is complex and dominated by the California Current rather than by local wind forcing. The California Current extends offshore a distance of about 400 km (249 miles) and to a depth of 300 meters (984 feet). The average current speed is approximately 0.25 meters per second (0.8 foot per second) and the greatest circulation occurs primarily during spring and summer (Hickey, 1993). When the nearshore portion of this surface current periodically flows poleward, it is referred to as the Coastal Countercurrent. The Davidson Current or California Undercurrent also flows poleward and is characterized as being warmer, saltier, and having lower oxygen and higher phosphate concentrations than the California Current. Although the northerly countercurrent exists throughout the year at depths of 200 to 300 meters (656 to 984 feet), it is strongest during the fall and winter months along the continental slope within 50 km (31 miles) of the coast. The appearance of this current in the late summer and fall brings warm, saline, low-dissolved-oxygen water to SCB nearshore habitat and beaches. Bottom contours and submarine topography also influence the movement and mixing of water masses in the SCB, resulting in a complete turnover every 1 to 3 months.

El Niño events produce striking changes in the SCB oceanographic conditions. They affect both physical factors (e.g., ocean temperatures) and indices of biological productivity (e.g., zooplankton densities). The El Niño events' alteration of regional currents and upwelling interrupts the supply of nutrients and affects the productivity of kelp forests and zooplankton populations that, in turn, support populations of fish and shellfish. The population changes can dramatically affect California's commercial and recreational fisheries harvests. During El Niño oceanographic events, the currents can carry planktonic organisms into the SCB from the south, such as spiny lobster and California sheephead, that normally have their centers of distribution off Baja California but can recruit heavily into southern California during strong El Niño events.

5.2.3.2 Aquatic Biological Survey Methods

Previous aquatic biological surveys conducted as part of the ongoing operation of the EPS include Clean Water Act 316(a) and 316(b) studies of AHL and the nearshore vicinity of EPS (SDG&E 1973, 1981; Tenera Environmental, 2008b), studies of subtidal marine life

(Bradshaw and Estberg, 1973) and wetland habitats (Bradshaw et al., 1976), and an aquatic resource survey conducted by MEC Analytical Systems in 1994 and 1995 (MEC Analytical Systems, 1995) that includes distribution and abundance of eelgrass (*Zostera marina*). The aquatic biological survey methods used in the various studies were varied and included otter trawl, beam trawl, and beach seines for fish and invertebrates and towed plankton nets for the more recent 316(b) studies. The study sampling methods were also reviewed by a technical review committee consisting of representatives of the California Regional Water Control Board, San Diego Region (Water Board), California Department of Fish and Game (CDFG), United States Fish and Wildlife Service (USFWS), and consultants. The long time span and varied habitats over which the surveys have been conducted have demonstrated that AHL is a biologically diverse system despite alterations from dredging, sedimentation, invasive species, shoreline development, and power plant water withdrawals. Based on the information provided in the studies, especially Tenera Environmental (2008a) (provided as New Appendix 5.2C), it was determined that no additional data collection was required for the project, especially since the decrease in water withdrawal from AHL with the retirement of EPS Generating Units 1, 2, and 3 reduces the potential for any impacts on marine habitats. The limited potential for impacts due to the operation of the ocean-water purification system were addressed by analyzing data previously collected from extensive studies on the effects of the intake and discharge and are described in the following sections.

5.2.3.3 Communities and Habitats

A comprehensive study on the ecological resources of AHL showed that it has good water quality and supports diverse infaunal, bird, and fish communities (MEC Analytical Systems, 1995). Eelgrass was found in all three lagoon segments but was limited to shallower depths in the Inner Lagoon because water turbidity reduces photosynthetic light penetration in deeper areas. The eelgrass beds provide a valuable habitat for benthic organisms that are fed upon by birds and fishes. Although eelgrass beds were less well-developed in areas of the Inner Lagoon, the Inner Lagoon also provides a wider range of habitats, including mud flats, salt marsh, and seasonal ponds, that are not found elsewhere in AHL. As a result, bird and fish diversity was highest in the Inner Lagoon.

Thirty-five species of fish were found during the 1994 and 1995 sampling conducted by MEC (MEC Analytical Systems, 1995). The Middle and Inner Lagoons had more species and higher abundances than the Outer Lagoon. During the 1995 survey, only four species were collected in the Outer Lagoon, compared to 14 to 18 species in the Middle and Inner Lagoons. The sampling did not include any surveys of the rocky revetment lining the Outer Lagoon that would increase the abundance and number of species collected. Recent impingement surveys in 2004 and 2005 at the EPS intakes yielded 96 taxa, demonstrating that the lagoon is a highly productive and diverse system (Tenera Environmental, 2008). In the 1995 study, silversides (*Atherinopsidae*) and gobies (*Gobiidae*) were the most abundant fish collected, with silversides—primarily jacksmelt and topsmelt—most abundant in the shallower Middle and Inner Lagoons where water temperatures are warmest. Gobies were most abundant in the Inner Lagoon, which has large, shallow mudflat areas that are their preferred habitat.

The outer coast has a diversity of marine habitats and includes zones of intertidal sandy beach, subtidal sandy bottom, rocky shore, subtidal cobblestone, subtidal mudstone, and water column. Organisms typical of sandy beaches include polychaetes, sand crabs, isopods, amphipods, and clams. Grunion use the beaches adjacent to the CECP site during their spawning season from March through August. Numerous infaunal species have been observed in subtidal sandy bottoms. Mollusks, polychaetes, arthropods, and echinoderms (especially sand dollars, *Dendraster excentricus*) comprise the dominant invertebrate fauna. Typical fish in the sandy subtidal include queenfish, white croaker, several surfperch species, speckled sanddab, and California halibut. Also, California spiny lobster and *Cancer* spp. crabs forage over the sand. Many species more typical of the outer coast can occasionally occur within AHL, carried there by incoming tidal currents.

The rocky habitat at the discharge jetty and on offshore reefs supports various kelps and invertebrates, including barnacles, snails, sea stars, limpets, sea urchins, sea anemones, and mussels. Giant kelp (*Macrocystis*) forests are an important habitat-forming community in the area offshore from AHL. Kelp beds provide habitat for a wide variety of invertebrates and fish. The water column and kelp beds are known to support many fish species, including northern anchovy, jacksmelt, queenfish, white croaker, garibaldi, rockfishes, surfperches, and halibut.

Marine-associated birds and wildlife that occur in the Pacific waters off AHL are numerous and include brown pelican, surf scoter, cormorants, western grebe, gulls, terns, and loons. Marine mammals, including porpoise, sea lions, and migratory gray whales, also frequent the adjacent coastal area.

5.2.3.4 Special-status Aquatic Species

Tidewater Goby. This is a federally endangered species that was once recorded as occurring in AHL prior to lagoon modifications in the early 1950s. No tidewater gobies (*Eucyclogobius newberryi*) were found during the studies of AHL by MEC (1995) and no tidewater goby larvae were identified in the recent larval fish studies by Tenera Environmental (2008). The present marine-influenced environment in the lagoon would not tend to support tidewater gobies because they prefer brackish water habitats.

East Pacific Green Sea Turtle. Green sea turtles (*Chelonia mydas*) can range in the eastern North Pacific from Baja California to southern Alaska but most commonly occur from San Diego south. Known nesting locations are all outside of the United States in Mexico and Central America. In the northern part of their range, they are occasionally attracted to warm-water discharge flows from coastal power plants, and as many as 30 individuals have been sighted in the discharge channel of the South Bay Power Plant in San Diego Bay. Although green sea turtles migrate considerable distances, the South Bay Power Plant discharge channel is the northernmost Pacific Coast location where they reside with any regularity. In 1978, all green sea turtles were afforded protection under the federal Endangered Species Act. Breeding populations of green sea turtles off Florida and Mexico are listed as endangered, and all other populations are listed as threatened.

5.2.4 Environmental Analysis

Potential direct and indirect impacts to terrestrial biological resources were evaluated in the CECP AFC, and the findings and conclusions of that analysis are not affected by the project enhancements and refinements. However, changes to the biological resources analysis have occurred as a result of the possible inclusion of the ocean-water purification system in the CECP. Therefore, the potential direct and indirect impacts to marine biological resources are analyzed in the following sections to determine the potential effects from the operation of the ocean-water purification system. A summary of potential impacts is presented in Table 5.3-1.

NEW TABLE 5.3-1
Summary of Potential Impacts of Intake Operations

Location	Impact	Sensitive Biological Resources	Species Affected
Intake Structure; Outer Agua Hedionda Lagoon	Entrainment of planktonic larvae and other planktonic organism into ocean water purification feedwater supply	None.	Coastal fishes and invertebrates with planktonic larval stages, planktonic marine species less than 3/8" minimum dimension.
Intake Structure; Outer Agua Hedionda Lagoon	Impingement of fishes and motile invertebrates into rotating screens protecting service water pumps	None.	Coastal fishes and invertebrates greater than 3/8" minimum dimension with weak swimming abilities

5.2.4.1 Standards of Significance

Impacts on biological resources are considered significant if one or more of the following conditions could result from implementation of the proposed project:

- Substantial effect, reduction in numbers, restricted range or loss of habitat for a population of a state or federally listed threatened or endangered species.
- Substantial effect, reduction in numbers, restricted range, or loss of habitat for a population of special-status species, including fully protected, candidate proposed for listing, California species of concern, and certain California Native Plant Society list designations.
- Substantial interference with the movement of any resident or migratory fish or wildlife species.
- Substantial reduction of habitat for native fish, wildlife, or plants.
- Substantial disturbance of wetlands, marshes, riparian woodlands, and other wildlife habitat.
- Removal of trees designated as heritage or significant under County or local ordinances.
- Conflict with local habitat conservation plan or other approved local, regional, or state plan.

5.2.4.2 Potential Impacts of Intake Operations

Purified ocean water will be used for the CECP process water, evaporative cooling water, miscellaneous plant uses (e.g., equipment wash water), and potentially onsite irrigation as an alternative to the use of CCR Title 22 reclaimed water originally proposed in the AFC. CECP will use highly purified (demineralized) water for producing steam. The reject stream is proposed to be discharged to the ocean via the existing EPS discharge conduit as an alternative to discharging through the existing sanitary/industrial sewer line to the Encina Wastewater Plant. Wastewater from miscellaneous project uses, evaporative coolers, and HRSG blowdown will be recycled to the raw water storage tank for reuse. Domestic wastewater generated at the CECP site will be discharged to the existing sanitary sewer line. The City has indicated in its docketed material that it can accommodate the small flows of sanitary waste.

Once CECP is in operation, EPS Generating Units 1, 2, and 3 will be retired. Current operation of these units requires withdrawal of seawater from AHL for plant cooling that is then discharge into the ocean through the existing discharge channel. Once these units are retired, the permitted volume of sea water for once-through cooling at the EPS will be reduced by more than one-quarter (224.64 mgd). This reduction will result in a decrease in impingement and entrainment effects at EPS. The retirement of EPS Generating Units 1, 2, and 3 and retirement of the once-through cooling pumps associated with these units are considered an integral part of compliance with Clean Water Act Section 316(b) at EPS. A small volume of makeup water relative to the existing use of seawater for EPS Generating Units 1, 2, and 3 would be used for the operation of the CECP’s steam production and evaporative cooling systems, and this would require pumping a maximum of 4.32 mgd of ocean water on a peak day from the existing EPS intakes. Of the 4.32-mgd peak day use, approximately 0.59 mgd, or 13.6 percent, would be purified into industrial water, 0.73 mgd of brine solution rejected from the ocean-water purification system would be returned to the outfall, and 3.1 mgd of untreated seawater would be used for mixing with the brine solution to bring salinity levels to normal levels at the outfall.

The intake of 4.32 mgd for the project will represent very little risk to marine organisms from entrainment and will present no risk from impingement due to the low intake approach velocities. Further, because the CECP facilitates the permanent retirement of 224.64 mgd of seawater cooling for EPS Generating Units 1, 2, and 3, the intake of 4.32 mgd for CECP represents a large reduction in overall permitted flows and translates into significant reductions in impingement and entrainment of marine organisms associated with implementing CECP. On its own and not recognizing the reduction in impingement and entrainment reductions by retiring EPS Generating Units 1, 2, and 3, the CECP process flows will result in an estimated total annual entrainment of 22.7 million fish larvae from AHL where the existing intake for the EPS is located. This estimate is based on data collected at the EPS intake during the 2004-2005 Impingement Mortality and Entrainment Characterization Study (Tenera Environmental, 2008b) (New Appendix 5.2.D)that was reanalyzed using the flows for the CECP. Three taxa of fishes (gobies, combtooth blennies, and northern anchovies) would account for nearly 95 percent of all fish larvae entrained, with gobies representing more than 60 percent of the total. If operated 365 days of the year, the losses are estimated to represent less than 0.3 percent of the larval population of gobies and 0.2 percent of the population of combtooth blennies in AHL. Other fish, including anchovies, halibut, and croakers, had very low entrainment based on the Empirical Transport Model used for the analysis. The small fraction of marine organisms potentially lost due to CECP entrainment would have no effect on these populations. The most frequently entrained species are very abundant in the area of the EPS intake, AHL, and the SCB. Therefore, the actual ecological effects due to any additional entrainment from the CECP would not be significant.

Impingement (entrapment of larger organisms on protective screens) is a function of water approach velocity, and as velocities increase, there is a greater likelihood that an individual will become pinned against the screens. Conversely, as flows decrease, so do impingement rates. The current flow velocities for the EPS intake calculated under full operation are slightly greater than 1 foot per second during low tide and slightly less than 1 foot per second at high tide due to a greater cross-sectional area of the intake (SDG&E, 1980). If only a single service water pump were in operation to provide seawater for the CECP ocean-water purification process, this would amount to less than 0.5 percent of the total pumping capacity presently permitted at the EPS. Approach velocities under this flow regime would be too low to cause any impingement of fishes or motile invertebrates.

The effects of the discharge of concentrated seawater from the CECP ocean water purification system were also evaluated using the same model used in the certified EIR for the CSDP (Jenkins and Wasyl, 2005). The analysis for the CECP evaluated a large number of cases, including a worst-case scenario using ocean-water mass properties and mixing conditions (New Appendix 5.2E). From these large numbers of solutions, high-resolution histograms (probability density functions) were constructed of salinity and dilution factor. The results showed that salinities exceeding the 36.5-ppt discharge limit proposed as an amendment to the Ocean Plan would only occur in a small area of the sub-tidal beach face and sandy bottom nearshore habitat (0.31 acre) immediately seaward of the discharge jetties and that the elevated salinities in these areas would be within the range tolerated by the indigenous marine organisms. The overall conclusions from the study were that the concentrated seawater discharge from the CECP ocean-water purification plant results in salinities that are well within the range that can be tolerated by indigenous marine organisms and are within the strictest standards being contemplated through amendments to the Ocean Plan. Additional information on the effects of the concentrated seawater discharge is presented in Section 5.15.

5.2.4.3 Potential Impacts to Special-status Species

Neither of the two special-status marine species described in Section 5.2.3.4 would be affected by operation of the CECP. In the case of tidewater goby, they do not currently occur in AHL, and the species' southernmost known locality is located in Cockleburr Canyon 9.2 miles (14.8 km) north of AHL. Furthermore, no larvae were found during intensive sampling in the marine waters around the project site; therefore, tidewater goby larvae would be at no risk of entrainment during operation of the ocean-water purification system for CECP. East Pacific green turtles are wide-ranging, but even if an individual were come into proximity of the intake in the AHL, the low approach velocities resulting from intake associated with the ocean-water purification system to support CECP operation would have no effect on their susceptibility to impingement. The project's dry-cooling system design means that there will not be a thermal plume or significant intake and discharge issues that could affect special-status species or other aquatic biota during operations. Additional information on the effects of the concentrated seawater discharge is presented in Section 5.15.

5.2.5 Cumulative Effects

The CSDP, on land that would be leased from Cabrillo Power I LLC at the EPS, has been proposed by Poseidon Resources as a new source of potable water for the region. The CSDP would require up to 304 mgd of ocean water and would produce up to 50 mgd of potable water and 50 mgd of concentrated seawater brine discharge. The ocean-water purification system that will produce industrial water for the CECP is much smaller that the CSDP, on the order of about 1 percent of the CSDP flows and requires only 4.32 mgd of ocean water. The CSDP and the CECP ocean-water purification system are two separate facilities, and while they will both intake seawater from the EPS once-through cooling system, they do not share other infrastructure or systems. In addition to the desalination units, the CSDP would include ancillary water and support facilities, including the offsite water delivery infrastructure to produce potable water.

There will be no cumulative effects to marine organisms associated with the CECP ocean-water purification system because this system will only be implemented as part of the CECP that requires the permanent retirement of EPS Generating Units 1, 2, and 3 and their associated once-through cooling systems. Therefore, the CECP, even with operation of the CSDP, will result in a net reduction of overall seawater use, thereby resulting in a direct reduction in impingement and entrainment effects. Even on a stand-alone basis, the very low proportional entrainment effects described above would not result in significant cumulative impacts when the effects are added to the CSDP.

5.2.6 Mitigation Measures

No mitigation measures are recommended for the CECP regarding potential impacts to marine habitats or marine species due to the operation of the CECP ocean-water purification system. Entrainment of larvae and other planktonic organisms from AHL is an unavoidable consequence of operation of the CECP ocean-water purification system; however, the fractional losses incurred on source populations are so small as to be indistinguishable from natural seasonal fluctuations. For example, effects on CIQ goby larvae, the most abundant fish group, was calculated to be less than 0.3 percent of the local population in AHL and the nearshore waters. Overall the retirement of EPS Generating Units 1, 2, and 3 represents a substantial decrease in potential intake system effects even with the operation of the ocean-water purification system.

The reduction in impacts to the marine environment and AHL that will result from the retirement of EPS Generating Units 1, 2, and 3 once CECP is in operation continues the record of resource stewardship shown by Cabrillo Power I LLC. The natural resources of the AHL are partially maintained through the action of EPS and Cabrillo Power I LLC, which owns the lagoon and a large portion of the property surrounding the lagoon. Cabrillo Power I LLC supports various conservation efforts in the lagoon through funding provided to the non-profit Agua Hedionda Lagoon Foundation. The overall health of the lagoon is partially due to the increased tidal flushing provided by the Cabrillo Power I LLC's maintenance dredging of the lagoon passage to the ocean to maintain water flow into the lagoon for use as cooling water. The excellent water quality is evidenced by the two aquaculture facilities located in the lagoon: a white seabass research facility, jointly managed by Hubbs/Sea World and CDFG, and a commercial mussel-growing facility. The recognition that maintaining tidal flow in coastal lagoons enhances water quality is reflected in SCE's agreement to perform maintenance dredging of the entrance to San Dieguito Lagoon south of AHL, which resulted in a reduction in the number of acres of wetland restoration required as part of the mitigation for impacts due to the operation of the San

Onofre Nuclear Generating Station. The stewardship efforts of Cabrillo Power I LLC, including the maintenance dredging of the entrance to the AHL, will continue after EPS Generating Units 1, 2, and 3 are retired and the CECP is operational.

5.2.7 Proposed Conditions for Certification

No additional conditions for certification are proposed beyond the nine conditions recommended in the AFC Section 5.2.6. No revisions to the existing Conditions of Certification are required.

5.2.8 Permits Required and Permit Schedule

The following agencies have jurisdiction over various biological resources in the project vicinity: USFWS, CDFG, National Oceanic and Atmospheric Administration National Marine Fisheries Service, California Regional Water Quality Control Board, and/or United States Army Corps of Engineers. Because CECP requires no discretionary federal approvals, and it will not impact any state or federal-listed species or state species of concern and will not cross any jurisdictional streams or wetlands, no agency contacts are provided. Because no special-status species would be adversely affected, no federal, state, or local permits are required for biological resources.

5.2.9 References

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Tenera Environmental. 2008b. *Clean Water Act Section 316(b) Impingement Mortality and Entrainment Characterization Study: Effects on the Biological Resources of Agua Hedionda Lagoon and the Nearshore Ocean Environment*. Submitted to Cabrillo Power I LLC. January.

United States Fish and Wildlife Service. 2008. 50 CFR Part 17; Revised designation of the tidewater goby (*Eucyclogobius newberryi*); Vol. 73, No. 21, published 31 January 2008.

5.3 Cultural Resources

The project enhancements and refinements require no additional analysis of cultural resources other than that which is included in the AFC, as the locations of the project enhancements and refinements (i.e., ocean-water purification facilities and the new SDG&E 230-kV switchyard) are located within the 1-mile cultural resource study area included in the AFC. The location of Tanks 5, 6, and 7, and the location of the stacks for CECP have not changed, and these areas were included in the cultural resource study area in the AFC. Because the locations of the Project enhancements and refinements occur within the cultural resource study area in the AFC, the project enhancements and refinements will not result in potential impacts any different from those addressed in the AFC, and no additional cultural resources LORS are applicable for the project enhancements and refinements. Consistent with the findings and conclusions of the AFC, any potential cultural resources impacts associated with this project enhancements and refinements will be less than significant.

The cultural resources mitigation measures in the AFC and the proposed Conditions of Certification that have been developed in coordination with CEC staff and included in previous Data Responses will be implemented as appropriate for the project enhancements and refinements.

5.4 Geologic Hazards and Resources

The project enhancements and refinements will not have any impact on geological hazards and resources, nor will they be affected by geologic hazards. The findings and conclusions included in the AFC regarding geologic hazards and resources are also applicable to the project enhancements and refinements. The geologic LORS included in the AFC also apply to the project enhancements and refinements, and there are no additional geologic LORS that would apply to the project enhancements and refinements. A final geotechnical report will be prepared prior to final engineering design for the CECP. Therefore, the project enhancements and refinements will not result in potential geologic impacts greater than those analyzed in the AFC, and there are no additional LORS. As a result, any potential geologic hazard impacts associated with the project enhancements and refinements will be less than significant.

The geologic hazards and resources proposed Conditions of Certification included in the AFC are also applicable for the project enhancements and refinements.

5.5 Hazardous Materials Handling

5.5.1 Introduction

While the project enhancements and refinements do not affect some of the environmental analyses described in the AFC, the ocean-water purification system will result in minor changes to hazardous materials handling. Hazardous materials associated with tank demolition and remediation and construction of the SDG&E 230-kV switchyard are limited to the types of materials used during standard construction activities and are not changed from the discussion included in Section 5.5 of the CECP AFC. Information regarding wastes generated during the implementation of tank demolition and remediation and construction of the new SDG&E 230-kV switchyard are addressed in Section 5.14.

The following subsections describe the refined hazardous materials handling impact analysis. Based on the analysis, the project enhancements and refinements will have limited additional impact on hazardous materials handling, and the CECP will continue to comply with all applicable LORS. Further, the proposed Conditions of Certification included in the AFC will ensure that any potential hazardous materials handling impacts related to the project enhancements and refinements are effectively mitigated to a less-than-significant level.

5.5.2 Laws, Ordinances, Regulations, and Standards

The federal, state, and local LORS applicable to hazardous materials handling and conformance are the same as described in the in the AFC. For a complete description of the applicable hazardous materials handling LORS, refer to Section 5.5.2 of the AFC. Additional LORS related to the tank demolition and remediation are discussed in Section 5.14, and additional LORS related to operation of the ocean water purification system are described in Section 5.15.

5.5.3 Affected Environment

The CECP site is located within the existing EPS, which is adjacent to the AHL and across Carlsbad Boulevard from the Pacific Ocean and Carlsbad State Beach (refer to Figure 1.2-1 of the CECP AFC). Land use in the area surrounding the CECP site is primarily industrial, commercial, residential, and open space. Sensitive receptors within a 1-mile radius of the project site include three schools, two day-care facilities, and one college (EDR, 2007). There are no medical centers, nursing homes, hospitals, arenas, or prisons located within the 1-mile radius. These receptors are listed in the AFC, Appendix 5.5A, and are shown in Figure 5.5-1 of the AFC. The nearest of these receptors, as well as the nearest school to the CECP site, is the Occupational Training Services, Inc. (College) located approximately 4,224 feet (0.80 mile) to the south of the project site. The nearest hospital/long-term health care facility is Tri-City Medical Center located approximately 7 miles north of the site in Oceanside, California.

5.5.3.1 Ocean-water Purification System

The CECP AFC proposed to use reverse osmosis and ion exchange to demineralize CCR Title 22 reclaimed water from the City's reclaimed water system to produce the high-purity industrial water required for the power plant's HRSGs and other process uses. The CECP

AFC stated that the resulting reverse osmosis reject stream, consisting of the reclaimed water's concentrated constituents, would be discharged to the City sanitary/industrial sewer system in accordance with the Encina Wastewater Authority Pretreatment Ordinance. However, the City will not, at this time, commit to providing reclaimed water to the CECP, nor will the City commit to permitting the CECP to discharge process industrial wastewater to the Encina Wastewater Authority's sanitary sewer system. As a result, the Applicant hereby analyzes, as part of the project enhancements and refinements, the construction of an ocean-water purification system to provide a reliable supply of industrial water for the CECP facility. This process will provide for demineralization of ocean water to produce the high-purity industrial process water for the evaporative cooling water, miscellaneous plant uses (e.g., equipment wash water), and onsite irrigation. Refer to Revised Figure 2.2-6a: *CECP Water Balance with 8 Hr/Day Power Augmentation*, and Revised Figure 2.2-6b: *CECP Water Balance-No Power Augmentation* for schematics of the ocean-water purification and demineralization processes.

The intake for the ocean-water purification processes will be from the existing EPS's once-through cooling water discharge, upstream of any process wastewater discharge into the EPS's discharge channel. Maximum daily intake of ocean water for purification would range between 604,500 gpd, without PAG, and 1.22 mgd, with PAG, operating 8 hours per day, plus additional seawater for mixing at the outfall totaling a maximum of 4.32 mgd.

The ocean-water purification process will consist of an ultrafiltration system installed upstream of the first-stage reverse osmosis system, with a storage tank to permit continuous operation regardless of the power plant's operating mode.

Demineralization of the purified ocean water will be the same process described in the CECP AFC for the demineralization of the City's reclaimed water. The first-stage reverse osmosis treated water (i.e., the purified ocean water) will pass through a second-stage reverse osmosis system, then the second-stage reverse osmosis permeate will be further demineralized by treatment using ion exchange to produce pure water suitable for injection to the HRSGs. The second-stage reverse osmosis and ion exchange were addressed in the AFC; the additional hazardous materials use for the first-stage process are addressed in this section.

The mobile ion exchange treatment unit will consist of cation, anion, and mixed ion-exchange resin beds to produce 200 gpm (daily average) of high-purity industrial water. The cation, anion, and mixed resin vessels will be mounted in a trailer that will be periodically taken offsite for regeneration. This arrangement will eliminate storage of the hazardous chemicals used to regenerate the ion exchange and the generation and discharge of ion-exchange wastewaters on site. The mobile trailer is proposed to consist of three cation vessels, two anion vessels, and one mixed-bed vessel that will be packed, regenerated, and made ready for reuse at a vendor location offsite.

To maintain continuous supply of high-purity industrial water, a fully regenerated trailer will be kept onsite as standby. The replacement of the spent trailer will consist of disconnecting the inlet and outlet pipes, removing the trailer and replacing it with the regenerated trailer, and reconnecting the piping and power supply. The exchange of trailers will take approximately 2 hours. The ion-exchange vessels inside the trailer will not drained onsite, and the resins will remain inside the vessels all the time.

The demineralizer resin beds will consist of premium 10 percent cross-linked cation resins, porous-type strong base anion resins, and mixed ion-exchange resins. These resin beds will be in separate vessels. The first in series of beds will be the cation beds, where positively-charged ions such as calcium, sodium, magnesium, metals, etc., will be captured by the cation resin and will be replaced with positively-charges hydrogen ions. The next in series will be the anion beds, where the negatively-charged ions such as sulfates, carbonates, chlorides, etc., will be replaced with hydroxyl ions. The mixed-bed resin unit will be staged at the end of the treatment train and will have a polishing function where trace amounts of cations and anions will be recaptured to produce extremely pure water. The conductivity of this water can often be less than 0.06 micromhos per centimeter.

The resin chemistry typically consists of a cross-linked polystyrene form of sulfonic acid (the cation function group) and a cross-linked polystyrene form of quaternary ammonium hydroxide (the anion function group). The resins are not regulated by Department of Transportation when shipped domestically by land. This Department of Transportation requirement is listed in Section 5.12.2 of the AFC. These resins are listed an "immediate health hazard" under Superfund Amendment and Reauthorization Act Title III and is considered a hazardous chemical as defined by OSHA Hazard Communication Standard, 29 CFR 1910.1200. These LORS are listed in Section 5.5.2 of the AFC.

As previously discussed the ion-exchange resin beds will be preceded by ultrafiltration and first- and second-stage reverse osmosis treatment. Depending upon the removal efficiency of the reverse osmosis treatment, the mobile demineralization unit can treat between 17 million to 26 million gallons of second-pass reverse osmosis permeate before becoming spent. Based on an assumed average operating capacity of 40 percent, the demineralization trailers will be replaced every 150 to 225 days.

5.5.3.2 East Encina 230-kV Switchyard

Construction and operation of the new SDG&E 230-kV switchyard will be similar to the electrical grid interconnection discussions provided in the AFC. No new or additional hazardous materials beyond those identified in the AFC for construction activities will be used as part of the implementation of this enhancement component. Refer to Section 2.0 for a detailed discussion of this switchyard.

5.5.3.3 Tank Demolition and Soil Remediation

The CECP will be constructed in the area currently occupied by the EPS East Tank Farm. The East Tank Farm consists of fuel-oil Tanks 5, 6, and 7 and occupies approximately 11 acres. In preparation for construction of the CECP facility, portions of the East Tank Farm will be demolished. Demolition will consists of the demolition and removal of three fuel-oil storage tanks (Tanks 5, 6, and 7) and associated piping, pumps, and other processing equipment and remediation of contaminated soils identified beneath the tanks and associated equipment and piping. No new or additional hazardous materials beyond those identified in the AFC for construction activities will be used as part of the implementation of this enhancement component. A detailed discussion of this enhancement component is provided in Section 2.3.3 and Section 5.13.

5.5.4 Environmental Analysis

This section discusses additional hazardous materials handling required to operate the ocean-water purification system. Refer the Section 5.5 of the AFC for hazardous materials handling information related to the CECP, as originally proposed. Table 5.5-1 lists the use and location of the additional hazardous materials required for operation of the ocean-water purification system. New Appendix 5.5E (Revised Tables 5.5-1A, 5.5-2A, 5.5.3A) includes the combined hazardous materials and chemicals required for construction and operation of the CECP, including the enhancement components.

TABLE 5.5-1
Use and Location of Hazardous Materials Associated with Operation of the Ocean Water Purification System Plant

Chemical	Use	Quantity (gallons/lbs)	Storage Location	State	Type of Storage
Ion Exchange Resin (Proprietary Mixture)	Demineralization of boiler feedwater	Two trailer units - operating weight of 55,000 lbs each	Portable/removable trailer to be located at the northeast corner of CECP site	Two units in 10 to 70% solution	Continuously Onsite

5.5.4.1 Construction Phase

As described in Section 5.5 of the AFC, the quantities of hazardous materials that will be handled during construction are relatively small, and construction personnel will be trained to handle the materials properly. Hazardous materials to be used during construction will include gasoline, diesel fuel, motor oil, hydraulic fluid, solvents, cleaners, sealants, welding flux, various lubricants, paint, and paint thinner. Tank demolition and remediation and construction of the ocean-water purification system and new SDG&E 230-kV switchyard will comply with the previously prepared and docketed Construction Storm Water Pollution Prevention Plan (SWPPP), which will be updated to reflect this new construction activity. Best Management Practices (BMPs) for erosion and sediment control, materials management, waste management, and pollution prevention will be implemented as described in the SWPPP. Implementation of the SWPPP will ensure that potential construction impacts from the use of hazardous materials during these construction activities are mitigated to less-than-significant levels.

5.5.4.2 Operations Phase

The modification to the ion-exchange system to support the ocean-water purification process does not introduce additional or more hazardous chemical materials for use and handling at the CECP facility. The ultrafiltration and reverse osmosis systems will not use any type of hazardous chemical materials. The ocean-water purification system to produce the high-purity industrial water required for CECP processes will have a less-than-significant impact on the environment and public health.

5.5.5 Mitigation Measures

No additional mitigation beyond what was discussed in Section 5.5 of the AFC will be required to accommodate hazardous materials handling associated with the project enhancements and refinements.

5.5.6 Proposed Conditions of Certification

While the potential impacts from the handling and use of hazardous materials at the CECP site were determined to be less than significant, the Applicant proposed Conditions of Certification for the CECP to ensure that such impacts remain below the level of significance. Impacts from the use and handling of hazardous materials to support the project enhancements and refinements are anticipated to be less than significant. The proposed Conditions of Certification from the CECP AFC that would apply include: HAZ-2, requiring preparation and implementation of a Hazardous Materials Business Plan; HAZ-6, requiring that vendors delivering any hazardous material to the site to use only the approved transportation route; and HAZ-12, requiring the preparation of Vulnerability Assessment to determine the level of appropriate security as part of the Site Security Plan.

5.5.7 Involved Agencies and Agency Contacts

No additional agencies and agency contacts beyond those identified in Section 5.5 of the AFC will be required for implementation of the project enhancements and refinements as it relates to hazardous materials handling. Refer to Section 5.14 for the additional agency contacts related to the tank demolition and remediation.

5.5.8 Permits Required and Permit Schedule

No additional permits beyond those identified in Section 5.5 of the CECP AFC will be required for implementation of the project enhancements and refinements, as it relates to hazardous materials handling. Refer to Section 5.14 for the additional permits related to the tank demolition and remediation.

5.5.9 References

Environmental Data Resource Inc. (EDR). 2007. EDR Offsite Receptor Report. Carlsbad Energy Center Project. July 30, 2007.

5.6 Land Use

The CECP and the enhancement components fall within the existing footprint of the EPS. As discussed in Section 5.6 of the AFC and in subsequent filings, the CECP is consistent with the applicable plans and policies of the City of Carlsbad; therefore, the enhancement components are also consistent with the applicable plans and policies of the City. Additional LORS, beyond those identified in the CECP AFC, apply to the tank demolition and remediation and ocean-water purification enhancement components, and a discussion of these LORS is included in Section 5.14 and Section 5.15 of this document.

Coastal permitting issues associated with the ocean-water purification system are related to the role of the CCC in the processing of the CECP AFC. A detailed description of the jurisdiction of the CCC is included in Section 5.6.3.2 of the AFC. The CCC, in partnership with coastal cities and counties, plans and regulates the use of land and water in the coastal zone. The Coastal Act sets forth general policies that govern the CCC's review of permit applications and local plans. Specific to energy facilities, the Coastal Act requires that the CCC designate specific locations within the coastal zone where establishing a thermal power plant subject to the Warren-Alquist Act could prevent the achievement of the objectives of the Coastal Act.

When the CEC undertakes the processing of an AFC for a power plant or transmission line proposed to be located, in whole or in part, within the coastal zone, the CCC may participate in the CEC process. The CCC participation in the CEC's AFC process is guided by the 1995 Memorandum of Agreement between the CEC and the CCC. This Memorandum of Agreement calls for the CCC to submit a report to the CEC, pursuant to PRC § 30413(d), prior to the CEC's release of the Final Staff Assessment. The CCC has formally communicated to the CEC, in a letter dated October 16, 2007 (docketed as part of 07-AFC-6) that, due to substantial workload and limited resources, the CCC will not be participating in the processing of the CECP.

The consistency of the CECP with CCC requirements, including conformance with the CCC Local Coastal Program, are discussed in detail in Section 5.6 of the AFC. The AFC stated that the CECP is consistent with the requirements of the Agua Hedionda Land Use Plan segment of the City of Carlsbad Local Coastal Program and other applicable City LORS related to modernization of the existing EPS. Similar to the consistency determination for the CECP, the implementation of these enhancement components, including the ocean-water purification system, is also consistent with the Land Use Plan, as well as the other applicable plans and policies. Therefore, no further discussion is required to address land use issues associated with the enhancement components.

5.7 Noise

Of the four components of the project enhancements and refinements, only the construction of the new SDG&E 230-kV switchyard on SDG&E property located between the railroad tracks and I-5 as shown in Revised Figure 2.2-1, has the potential to result in increase construction noise levels near offsite land uses (i.e., an adjacent hotel located near the intersection of Cannon Road and Avenida Encinas, the location of Noise Monitoring Location 1 in the AFC). The other components of the project enhancements and refinements (i.e., an increase in the stack height to 139 feet; the inclusion of the demolition of Tanks 5, 6, and 7; and the inclusion of an ocean-water purification system consisting of trailer-mounted water treatments units to provide the project with industrial water) will not result in noise levels during construction or operations that exceed those addressed in the AFC that were documented to be less than significant. The four components of the project enhancements and refinements are not anticipated to result in conditions that will affect the project's ability to comply with the applicable noise LORS included in the AFC. The project enhancements and refinements will comply with the noise-related mitigation measures and proposed noise conditions of certification in the AFC. Therefore, the project enhancements and refinements will not result in potential noise impacts greater than those analyzed in the

AFC. As a result, any potential noise and vibration impacts associated with the project enhancements and refinements will be less than significant.

As with other large, industrial construction projects, there are certain construction components, including portions of new SDG&E 230-kV switchyard, that may require construction to be accomplished in off-hours, including night time and on Saturday and/or Sunday. This work could include specific concrete pours (depending on foundation being poured, this may require extended hours to complete the pour), transformer setup (includes vacuum filling and oil processing that must be performed continually and may take several days/nights to complete), and cutovers of the transmission/distribution circuits being transferred to the new switchyard. Cutovers will be done in such a manner that system integrity and customer reliability will not be comprised and, as such, may require cutovers to be done in off-hours.

The AFC included the following Condition of Certification to address procedures for construction during off-hours, including night time and on Saturday and/or Sunday:

> **NOISE-6**: In accordance with the Carlsbad Municipal Code Section 8.48.010, construction activities are permitted to occur 24 hours a day, 7 days a week provided they do not create disturbing, excessive, or offensive noise. There is the potential for double shifts that would expand the hours of construction; however, noisy construction work (that causes offsite annoyance as evidenced by the filing of a legitimate noise complaint) will be confined to between 7:00 a.m. and 7:00 p.m. unless an exception to these hours is granted by the Chief Building Official. Truck engine exhaust brake use shall be limited to emergencies.
>
> Verification: The Applicant shall transmit to the Construction Project Manager, in the first Monthly Construction Report, a statement acknowledging that the above restrictions will be observed throughout the construction of the project.

Chapter 8.48 of the City of Carlsbad Municipal Code states that it is a violation to create excessive construction noise “after sunset any day or before 7 a.m. Monday through Friday and before 8 a.m. on Saturday; all day on Sunday, New Year’s Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day and Christmas Day.”

However, Chapter 8.48 provides exceptions for emergency repairs and “in nonresidential zones, provided there are no inhabited dwellings within 1,000 feet of the building or structure being erected, demolished, altered or repaired or the exterior boundaries of the site being graded or excavated.”

The project enhancements and refinements will not result in potential noise impacts greater than those analyzed in the AFC, and there are no additional noise LORS or Conditions of Certification required by the project enhancements and refinements. As a result, any potential noise impacts associated with the project enhancements and refinements will be less than significant.

5.8 Paleontological Resources

Because the locations of the project enhancements and refinements (i.e., ocean-water purification facilities and the new SDG&E 230-kV switchyard) are located within the 1-mile paleontological resource study area included in the AFC, the project enhancements and refinements require no additional analysis of paleontological resources other than those is included in the AFC. The location of Tanks 5, 6, and 7, and the location of the stacks for CECP have not changed, and these areas were included in the paleontological resource study area in the AFC. Because the locations of the project enhancement and refinement were included in the paleontological resource study area in the AFC, the project enhancements and refinements will not result in potential impacts any different from those addressed in the AFC, and no additional LORS are applicable for the project enhancements and refinements. Consistent with the findings and conclusions of the AFC, any potential paleontological resources impacts associated with this project enhancements and refinements will be less than significant.

The paleontological resources mitigation measures in the AFC and the proposed Conditions of Certification that have been developed in coordination with CEC staff and have been included in previous Data Responses will be implemented as appropriate for the project enhancements and refinements.

5.9 Public Health

5.9.1 Introduction

Due to the revised air quality modeling analysis performed for CECP—including the revised modeling performed for the increase in stack height from 100 feet to 139 feet in response to CEC Data Request Numbers 84, 85, 87, 89, 90, and 118—it was also necessary to revised the public health risk assessment. A revised health risk assessment was performed to address the issues raised by the CEC data requests and to address the effect of the project refinement of an increase in the stack height to 139 feet. The following subsections describe the revised health risk assessment results and the evaluation of compliance with significance thresholds.

5.9.2 Environmental Analysis

5.9.2.1 Toxic Air Contaminant Exposure Assessment

While there are no changes in the toxic air contaminant emissions proposed as part of the project enhancements and refinements, the revisions of the air quality modeling analysis discussed in Section 5.1 of this document could affect the results of the public health risk assessment. Human health risks potentially associated with toxic air contaminant emissions from the operation of the CECP were re-evaluated using the same methodology discussed in the AFC.

5.9.2.2 Dispersion Modeling

The air dispersion modeling for this analysis was conducted similar to the approach used in the AFC for the CECP. The dispersion modeling was conducted using the AERMOD model, and the HARP model was used to develop unit risk factors based on an exposure of 1.0 $\mu g/m^3$. The only changes to this analysis are discussed in Section 5.1.2.2 of this document regarding the changes to the ambient air dispersion modeling methodology and the increase in stack height to 139 feet. The input and output modeling files for the revised air dispersion analysis are included in the enclosed compact disc.

5.9.2.3 Summary of Toxic Air Contaminant Exposure Assessment Results

A summary of the revised modeled health risk impacts is presented in Revised Table 5.9-6 in New Appendix 5.9C. The revised results are shown in strikethrough/underline format. As shown on this table, there are only minor changes to the modeling results due to the increase to the stack height. In addition, the revised results remain below the significance levels for carcinogenic risk, cancer burden, acute health hazard index, and chronic health hazard index.

5.10 Socioeconomics

The construction of the project enhancements and refinements will result in an increase in construction workforce and local purchases of materials and supplies during construction of the new SDG&E 230-kV switchyard and will result in a limited increase in annual operations and maintenance expenditures for the new switchyard in the local area over the life of the CECP. The other components of the project enhancements and refinements (i.e., increase stack height, ocean-water purification system, which would replace the reclaimed water pipeline analyzed in the AFC, and the tank farm demolition and remediation) generally fall within the construction workforce and construction-related expenditures addressed in the AFC. Therefore, this section addresses focuses on the increase in construction workforce and in construction-related expenditures and annual (operations and maintenance) expenditures related to the new SDG&E 230-kV switchyard. The following subsections provide the refined socioeconomics impact analysis.

5.10.1 Laws, Ordinances, Regulations, and Standards

The construction and operation of the project enhancements and refinements are similar to those already analyzed in the AFC and, as discussed in the AFC, the CECP is in conformance with the applicable federal, state, and local LORS related to socioeconomics. For a complete description of the applicable socioeconomic LORS, refer to Section 5.10.2 of the AFC.

5.10.2 Affected Environment

Since the local and regional socioeconomic environment has not changed since the AFC was filed in September 2007, there is no need to update that information as part of the analysis of the project enhancements and refinements. For a complete description of the affected environment discussion on socioeconomics, refer to Section 5.10.3 of the AFC.

5.10.3 Environmental Analysis

This section assesses the potential socioeconomic impacts of the project enhancements and refinements.

5.10.3.1 Construction Impacts

The economic impacts from construction activities related to the project enhancements and refinements are discussed in this subsection. As discussed in Section 5.10 above, the increase in construction workforce and in construction-related expenditures associated with the project enhancements and refinements are related to the new SDG&E 230-kV switchyard will occur during approximately 10 months of the overall CECP construction scheduled.

Construction Workforce. The primary trades in demand for the construction of the 230-kV switchyard will include carpenters, electricians, laborers, and equipment operators, which are also required for construction of the other components of the CECP, as analyzed in the AFC. New Table 5.10-1A estimates the construction personnel requirements for the 230-kV switchyard. Total construction personnel requirements for 230-kV switchyard will be approximately 132 person-months or 11 person-years.

As evaluated in the AFC, there is an adequate construction workforce in San Diego County to meet the needs of CECP's construction labor requirements, including the additional construction workforce required for the project enhancements and refinements. Therefore, the overall CECP construction, including the project enhancements and refinements, will not place an undue burden on the local construction workforce.

NEW TABLE 5.10-1A
Construction Personnel by Craft – 230-kV Switchyard

Month	1	2	3	4	5	6	7	8	9	10	Total
Site Preparation											
Equipment Operators	4										4
Laborers	4										4
Operating Engineers	1										1
Surveyors	1										1
Total	10										10
Switchyard Below Grade Work											
Carpenters		3	3	3	3						12
Electricians		3	3	3	3						12
Laborers		4	4	4	4						16
Operating Engineers		1	1	1	1						4
Total		11	11	11	11						44
Facility Construction											
Electricians					16	16	16	16	16	16	96
Equipment Operators					2	2	2	2	2		10
Laborers					4	4	4	4	4		20
Operating Engineers					1	1	1	1	1	1	6
Total					**23**	**23**	**23**	**23**	**23**	**17**	**132**

Population Impacts. Since the additional construction workforce requirements during construction of the 230-kV switchyard is relatively small and no population impacts were anticipated in the AFC during the construction phase of the CECP, no impacts to population is expected during construction of the project enhancements and refinements.

Housing Impacts. No housing impacts are anticipated from the project enhancements and refinements construction activities since the construction workforce is expected to be from the San Diego County region and will most likely commute daily to the project site.

Impacts to Local Economy and Employment. The cost of materials and supplies required during construction of the 230-kV switchyard is estimated between $3 million and $7 million. The estimated value of materials and supplies that will be purchased locally is $3 million (in 2008 dollars).

The construction o f the 230-kV switchyard will provide an estimated $4,042,000 in construction payroll. The anticipated payroll for construction workers, as well as the purchase of materials and supplies during construction, will have a beneficial impact on the area. Assuming, conservatively, that 90 percent of the construction workforce will reside in San Diego County, it is expected that $3,637,800 will stay in the local area during the 10-month construction period for the 230-kV switchyard. These additional funds will result in a temporary beneficial impact by creating the potential for other employment opportunities for local workers in other service areas, such as transportation and retail. All cost estimates are in constant 2008 dollars, as are the economic benefits noted in this section.

Indirect and Induced Economic Impacts from Project Enhancements and Refinements Construction. Construction activities would result in secondary economic impacts (indirect and induced impacts) within San Diego County. Indirect and induced employment effects include the purchase of goods and services by firms involved with construction, and induced employment effects include construction workers spending their income within the County. In addition to these secondary employment impacts, there are indirect and induced income effects arising from construction.

Indirect and induced impacts were estimated using an IMPLAN Input-Output model of San Diego County. IMPLAN is an economic modeling software program. The estimated indirect and induced employment within San Diego County related to the construction of the 230-kV switchyard would be 43 and 34 jobs, respectively. These additional jobs result from about $3 million in annual local construction expenditures as well as the $2,546,460 in spending by local construction workers. The $2,546,460 represents the disposable portion of the annual local construction payroll (assumed to be 70 percent of $3,637,800[3] in annual construction payroll spent locally). Assuming an average monthly direct construction employment of 13, the employment multiplier associated with the construction phase of the project is approximately 6.9 (i.e., [13 + 43 + 34]/13). This project construction phase employment multiplier is based on a Type SAM model.

Indirect and induced income impacts were estimated at $1,744,760 and $1,371,580, respectively, during construction of the 230-kV switchyard. Assuming a total annual local construction expenditure (payroll, materials, and supplies) of about $5,546,460 ($2,546,460 in

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[3] Annual local portion of construction payroll = $4,042,000 x 90% = $3,637,800. The disposable portion of the annual local construction payroll = $3,637,800 x 70% = $2,546,460.

payroll + $3 million in materials and supplies), the project construction phase income multiplier based on a Type SAM model is approximately 1.6 (i.e., [$5,546,460 + $1,744,760 + $1,371,580]/$ 5,546,460).

Fiscal Impacts. The estimated value of materials and supplies that will be purchased locally (within San Diego County) construction of the 230-kV switchyard is $3 million. The effect on fiscal resources during construction will be from sales taxes realized on equipment and materials purchased in the County and from sales taxes from expenditures. The sales tax rate in the City of Carlsbad is 7.75 percent (as of July 1, 2008). Of this, 6.25 percent goes to the state, 0.25 percent goes to the County, 1 percent goes to the place of sale, and 0.25 percent goes to the special districts (BOE, 2008). The total local sales tax expected to be generated during the 10-month construction period for the 230-kV switchyard construction is $232,500 (i.e., 7.75 percent of local sales). Assuming all local sales are made in Carlsbad, the maximum sales tax the City could receive is $37,500, annually.

Impacts on Education. The construction of project enhancements and refinements will not cause population changes or housing impacts to the region because most employees will commute to the site daily from areas within the County, as opposed to relocating to the area. As a result, construction of enhancements and refinements will not cause a significant increase in demand for school services.

Impacts on Public Services and Facilities. Since the project enhancements and refinements construction is scheduled to be within the overall CECP construction period and the AFC concluded that there would be no burden on public service providers, no additional impacts are anticipated from the project enhancements and refinements construction.

Impacts on Utilities. Project enhancements and refinements construction will not make significant adverse demands on local water, sanitary sewer, electricity, or natural gas. Given the number of workers and temporary duration of the construction period, the impacts on the local sanitary sewer system would not be significant.

5.10.3.2 Operational Impacts

Since there are no changes to the operation of the CECP as a result of the project enhancements and refinements, there are no impacts associated with the operation of the CECP.

5.10.4 Environmental Justice

Similar to the construction of the CECP, since construction impacts from project enhancements and refinements are temporary and will be mitigated to less-than-significant levels, as discussed in the AFC, no environmental justice impacts associated with the project are expected.

5.10.5 Summary

The project enhancements and refinements will not result in potential impacts or benefits substantially greater than those analyzed in the AFC, and no LORS will change as a result of the project enhancements and refinements. As a result, any potential socioeconomics impacts associated with the project enhancements and refinements will be less than significant. Additionally, there will be no environmental justice impacts.

5.10.6 References

California Board of Equalization (BOE). 2008. California City and County Sales and Use Tax Rates *Publication 71*. Internet site: http://www.boe.ca.gov/pdf/pub71.pdf

5.11 Soils

The project enhancements and refinements will not result in significant disturbance of additional land, and the enhancements and refinements will not result in the potential for significant additional wind or water erosion of soils during construction. The findings and conclusions included in the AFC regarding impact on soils and wind or water erosion of soils during project construction remain applicable. The soils LORS included in the AFC also apply to the project enhancements and refinements, and there are no additional soils LORS what would apply to the project enhancements and refinements. The CECP Construction SWPPP that was submitted by the Applicant as part of Data Response Set 2 and the various construction BMPs included in the SWPPP are applicable and will be applied during construction of the project enhancements and refinements. In addition, the proposed soil Conditions of Certification included in the AFC are applicable to the project enhancements and ,refinements and no additional soil Conditions of Certification are required.

Based on the revised analysis below that includes the construction of the project enhancements and refinements along with the other CECP components, the project enhancements and refinements will not result in potential soil impacts greater than those analyzed in the AFC. As a result, any potential soil impacts associated with the project enhancements and refinements will be less than significant.

5.11.1 Potential for Soil Loss and Erosion

The factors that have the largest effect on soil loss include steep slopes, lack of vegetation, and erodible soils composed of large proportions of fine sands. The soils found in the area of the CECP, including the location of the new SDG&E 230-kV switchyard, are gently sloping to moderately steep (the estimated average slope of the site is less than 2 percent based on the previous development of the property). In general, the soil type in the project area, as indicated by the NRCS mapping (1973), is relatively coarse grained (loamy sand). These soils are expected to have relatively low water erosion potential and a moderately high wind erosion potential for the following reasons:

- There are nearly level conditions at the project site, and the soils are expected to have moderate permeability (and, consequently, low runoff).
- The loamy sandy surface materials are expected to be readily transported by wind; however, it is expected that the construction laydown areas will be covered (by gravel or paving) immediately after grading to prevent subsequent wind erosion losses.

5.11.2 Soil Erosion During Construction

As the conditions that could lead to excessive soil erosion are not present at the project site, very little soil erosion is expected during the construction period. In addition, the Construction SWPPP and its BMPs will be implemented during construction. Therefore, impacts from soil erosion are expected to be less than significant.

Despite the low potential for soil erosion in the project area, estimates of erosion by water and wind are provided below.

5.11.2.1 Water Erosion

An estimate of soil loss during construction of the project, including the project enhancements and refinements, by water erosion is found below in Revised Table 5.11-3. This estimate was developed using the Revised Universal Soil Loss Equation (RUSLE2).

With the implementation Construction SWPPP and its BMPs, as is required by the National Pollutant Discharge Elimination System (NPDES) permit, the total estimated project soil loss of 1.49 tons, as shown in Revised Table 5.11-3. This estimated amount is relatively minor and would not constitute a significant impact. It should also be recognized that these estimates of accelerated soil loss by water are very conservative (overestimate of soil loss) because it assumes only a single BMP (i.e., silt fencing), whereas the Project's Construction SWPPP includes multiple soil erosion control measures.

5.11.2.2 Wind Erosion

The potential for wind erosion of surface material was estimated by calculating the total suspended particulates that could be emitted as a result of grading and the wind erosion of exposed soil. The total site area and grading duration were multiplied by emission factors to estimate the total suspended particulate matter (TSP) emitted from the site. Fugitive dust from site grading was calculated using the default PM_{10} emission factor used in URBEMIS2002 and the ratio of fugitive TSP to PM_{10} published by the Bay Area Air Quality Management District (BAAQMD, 2005). Fugitive dust resulting from the wind erosion of exposed soil was calculated using the emission factor in AP-42 (USEPA, 1995; also in Table 11.9-4 in BAAQMD, 2005).

Revised Table 5.11-4 summarizes the mitigated TSP predicted to be emitted from the project site from grading and the wind erosion of exposed soil. Without mitigation, the maximum predicted erosion of material from the site is estimated at 5.3 tons over the course of the project construction cycle. This estimate is reduced to 1.9 tons by implementing basic mitigation measures such as water application (see mitigation measures, below). These estimates are conservative because these estimates make use of emission rates for a generalized soil rather than for specific soil properties.

5.11.3 References

Bay Area Air Quality Management District (BAAQMD). 2005. http://www.baaqmd.gov/pmt/handbook/s12c03fr.htm.

REVISED TABLE 5.11-3
Estimate of Soil Loss by Water Erosion Using RUSLE2

			Estimates Using Revised Universal Soil Loss Equation[a]		
Feature (acreage)[b]	**Activity**	**Duration (months)**	**Soil Loss (tons) without BMPs**	**Soil Loss (tons) with BMPs**	**Soil Loss (tons/yr) No Project**
Project Site - single construction period (10 acres)	Grading	5	17.5	0.22	0.5300
	Construction	17	26.9	0.75	---
New 230-kV Switchyard (7.56 acres)	Grading	2	5.3	0.07	0.4007
	Construction	1	1.2	0.03	---
Laydown Areas (A-F) (7.00 acres)	Grading	0.25	0.6	0.01	0.3710
	Construction	12	13.3	0.37	---
Transmission Lines (4.62 acres for construction; 0.008 acre for pole footprints)	Grading	0.5	0.001	0.000	0.0000
	Construction	2	1.463	0.030	---
Reclaimed Water Line (4.21 acres for construction; 0.34 acre for trench)	Grading	1	0.058	0.0005	0.0000048
	Construction	1	0.326	0.003	---
Potable Water Line (1.38 acres for construction; 0.11 acre for trench)	Grading	1	0.039	0.0002	0.0000012
	Construction	1	0.200	0.001	---
Sanitary Sewer Line (1.26 acres for construction; 0.10 acre for trench)	Grading	1	0.035	0.0002	0.0000011
	Construction	1	0.200	0.0011	---
Gas Line (1.26 acres for construction; 0.10 acre for trench)	Grading	1	0.035	0.0002	0.0000011
	Construction	1	0.200	0.0011	---
Soil Loss Estimates (single construction period)	All activities listed above	47.75	67.38	1.49	1.30

Notes:

[a] Soil losses (tons/acre/year) are estimated using RUSLE2 software available online at http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_index.htm.

The soil characteristics were estimated using RUSLE2 soil profiles corresponding to the mapped soil unit. Soil loss (R-factors) were estimated using 2-year, 6-hour point precipitation frequency amount for the site coordinates using the online tools at http://www.nws.noaa.gov/ohd/hdsc/noaaatlas2.htm. Estimates of actual soil losses use the RUSLE2 soil-loss times the duration and the affected area. The No Project Alternative estimate does not have a specific duration so loss is given as tons/year.

[b] Acreages assume a 50-foot construction corridor for the all linear features. The ocean-water purification system water lines and potable water lines and the sewer and gas lines will have a 4-foot-wide trench, and the transmission line will have 21 poles with each pole having a 4 by 4-foot excavation footprint.

Other Project Assumptions as follows:

It is assumed that the grading/excavation for all the poles will be completed within 2 weeks and the entire installation will be completed within an additional 2 months.

It is assumed that the demolition of the tanks and excavation of the cushion soils on the project site will take 3 months.

It is assumed that grading for the project site will take 3 months (single construction period).

REVISED TABLE 5.11-3
Estimate of Soil Loss by Water Erosion Using RUSLE2

			Estimates Using Revised Universal Soil Loss Equation[a]		
Feature (acreage)[b]	**Activity**	**Duration (months)**	**Soil Loss (tons) without BMPs**	**Soil Loss (tons) with BMPs**	**Soil Loss (tons/yr) No Project**

It is assumed that construction will take an additional 19 months (single construction period).

It is assumed that grading for the 230-kV switchyard will take 2 months, and construction will take an additional 1 month until the site is completely covered.

It is assumed that excavation for the ocean-water line, potable-water, sanitary-sewer, and gas lines will take 1 month and that construction will take an additional 1 month for each line.

RUSLE2 Assumptions as follows:

100-foot slope length. Estimated soil unit slope is the lower end of the unit slope class due to the fact that the project area was previously developed.

Construction soil losses assume the following inputs: Management = bare ground; Contouring = bone, rows up and down hill; Diversion/terracing = none; Strips and Barriers = none.

Grading soil losses assume the following inputs: Management = bare ground/rough surface; Contouring = none, rows up and down hill.

Construction with BMP soil losses assume the following inputs: Management = silt fence; Contouring = perfect, no row grade; Diversion/terracing = none; Strips and Barriers = two fences, one at end of RUSLE slope.

No Project soil losses assume the following inputs: Management = dense grass, not harvested; Contouring = none, rows up and down hill; Diversion/terracing = none; Strips and Barriers = none.

REVISED TABLE 5.11-4
Estimate of TSP Emitted from Grading and Wind Erosion

Emission Source	Acreage	Duration (months)	Unmitigated TSP (tons)	Mitigated TSP (tons)
Grading Dust				
Project Site (single construction period)	10.00	5	0.859	0.301
New 230-kV Switchyard	7.56	2	0.260	0.091
Laydown Areas (Areas A-F)	7.00	0.25	0.030	0.011
Transmission Line (poles)	0.0077	0.5	0.00007	0.00002
Gas Line (4-foot trench)	0.101	1	0.0017	0.0006
Ocean Water Line (4-foot-wide trench)	0.165	1	0.0028	0.0010
Potable Water Line (4-foot-wide trench)	0.110	1	0.0019	0.0007
Sanitary Sewer Line (4-foot-wide trench)	0.101	1	0.0017	0.0006
Windblown Dust				
Project Site (single construction period)	10.00	17	1.35	0.471
New 230-kV Switchyard	7.56	1	0.239	0.084
Laydown Area A and Western Berm	5.50	12	2.09	0.732
Transmission Lines (40-foot corridor)	4.620	2	0.29	0.10
Gas Line (40-foot corridor)	1.263	1	0.040	0.014
Ocean Water Line (40-foot corridor)	2.060	1	0.07	0.02
Potable Water Line (40-foot corridor)	1.377	1	0.044	0.015
Sanitary Sewer Line (40-foot corridor)	1.263	1	0.040	0.014
Estimated Total (single construction period)			5.314	1.860

Project Assumptions:

Demolition of the tanks and excavation of the cushion soil will take 3 months, followed by grading for the construction site that will be completed in a 3-month (single construction); approximately 100 percent of the area will be disturbed.

Construction for the project areas will extend an additional 19 months after grading. Approximately one-quarter of the project site will have bare soil exposure during the length of the construction period.

Grading of the new 230-kV switchyard will take 2 months. The entire site may be exposed for 1 month during construction but will then be completely covered.

Laydown areas (A-F) will require 1 week for grading, then will be graveled. At Area A, 4 out of 4.3 acres will be used to stockpile soil.

The western berm will cover an area of approximately 1.5 acres.

Excavation of transmission line pole holes will take 2 weeks, followed by a 2-month construction period.

The overhead transmission lines will have 21 new poles outside of the project footprint. Each pole will have a 4- by 4-foot area for a total impact permanent area of 0.0077 acre.

All linears will have a 50-foot construction corridor. All pipelines will have a 4-foot-wide trench.

Data Sources:

[a] PM_{10} Emission Factor Source: Midwest Research Institute. 1996. *South Coast AQMD Project No. 95040, Level 2 Analysis Procedure*. March.

[b] PM_{10} to TSP Conversion Factor Source: Bay Area Air Quality Management District CEQA Guidelines. 1999. *Assessing the Air Quality Impacts of Projects*. 1999.

South Coast Air Quality Management District. 1993. *CEQA Handbook*. Table 11-4 for mitigation efficiency rates (estimated at 65 percent for watering three times daily).

5.12 Traffic and Transportation

The four components of the project enhancements and refinements will not result in an increase in the peak construction workforce or the peak construction truck deliveries. Therefore, the project enhancements and refinements will not have any additional traffic impacts above and beyond those addressed in the AFC. In addition there are no additional traffic LORS or Conditions of Certification required by the project enhancements and refinements. As a result, any potential traffic impacts associated with the project enhancements and refinements will be less than significant.

5.13 Visual Resources

While the project enhancements and refinements do not affect some of the environmental analyses described in the AFC, the increase in stack height to 139 feet and the inclusion of the new SDG&E 230-kV switchyard will result in minor changes to visual resources. As discussed in Section 5.13.1, the increase in stack height and the new SDG&E 230-kV switchyard do not change the regional visual context or the landscaping setting. In addition, the project enhancements and refinements do not result in a change of the visual character of the project nor do they result in a change of the view corridors, vantage points, and viewsheds related to the project. The visual resource LORS included in the AFC also apply to these project enhancements and refinements, and there are no additional visual resource LORS that would apply to these enhancements and refinements.

As discussed in the analysis section below, the findings and conclusions included in the AFC regarding visual resources related to the project remain applicable. In addition, the proposed visual resource Conditions of Certification included in the AFC are applicable to the project enhancements and refinements, and no additional visual resource Conditions of Certification are required.

5.13.1 Visual Resource Analysis

5.13.1.1 New SDG&E 230-kV Switchyard

The project enhancement and refinements include a new SDG&E 230-kV switchyard to be located on SDG&E property located between the railroad right of way and I-5 and south of the CECP site, as shown in Revised Figure 2.1-1 – CECP Plot Plan. The switchyard will occupy approximately 2.5 acres of the SDG&E property that is used for employee training and includes the existing SDG&E Canon switchyard. The 230-kV switchyard site lies about 750 feet north of Cannon Road.

New Figures 2.2-2A and 2.2-2B provide a low angle representation of the new SDG&E 230-kV switchyard and cross-section elevations of the new switchyard, respectively.

New Switchyard Visibility Due to intervening topography, vegetation, and development, the new 230-kV switchyard site is not generally visible from the key observation points employed for purposes of the AFC visual analysis. It is expected that portions of the new SDG&E 230-kV switchyard could be visible from a limited number of viewing locations, including places along I-5, Cannon Road, and the railroad corridor. The switchyard could also be partially visible near the northern end of Avenida Encinas.

New Figure 5.13-4H presents four photographs that portray representative public views toward the new 230-kV switchyard site. The locations of these four photo viewpoints are shown on New Figure 5.13-3A. Photo A-1 in New Figure 5.13-4H is a view from Cannon Road west of the site. From this area, various elements including the concrete block perimeter wall of the existing SDG&E site, and mature trees located along Cannon Road and on the power plant site, screen views toward the proposed switchyard.

Photo A-2 in New Figure 5.13-4H, taken from the mini-park located on Cannon Road at Avenida Encinas, includes the existing stack of the EPS, seen beyond existing vegetation at the left side of the photo. From this location, the new substation will be screened by vegetation and buildings that are located across Avenida Encinas and are seen on the right side of the photo.

Photo A-3 in New Figure 5.13-4H is a view from northbound on I-5 looking northwest toward the switchyard site. The existing EPS stack is partially visible behind mature trees on the left edge of this view; one of the existing transmission towers appears on right. Although it would be seen for only for a split second, a partial view of the new switchyard may be available from northbound I-5. With respect to views from northbound I-5, the new structures will generally be screened by mature trees to the west of the roadway, as well as the tall shrubs in the median.

Photo A-4 in New Figure 5.13-4H depicts a view from a turnout and fruit stand located along Cannon Road about 0.25 mile east of the switchyard site (east of I-5). This view encompasses low agricultural fields and overhead transmission lines supported on steel poles in the foreground. In the background, on the left side of the photograph, is the existing EPS, and various existing transmission structures appear in the middleground.

New Figure 5.13-13 presents a before and after view of the new 230-kV switchyard from the vantage point along Cannon Road shown in Photo A-4 in New Figure 5.13-4H. In this view, the existing EPS and transmission lines appear prominently. The simulation shows the new switchyard on the left side of the view with the CECP facility transmission towers in the center and on the right. Vegetation to the west of I-5 partially screens lower portions of the switchyard and new transmission towers. The simulation demonstrates that portions of the new 230-kV switchyard will appear against the backdrop of the existing EPS and will be barely visible. Other portions will be visible against the sky; however, given the presence of existing structures, the new elements will not be particularly noticeable. A comparison of the before and after images indicates that the new 230-kV switchyard will not substantially alter existing visual conditions.

Conclusion In relationship to existing features in the landscape, which include a number of transmission lines and the existing EPS, the new SDG&E 230-kV switchyard is a relatively low-profile facility. As the simulation of the switchyard in New Figure 5.13-13 demonstrates, the new SDG&E 230-kV switchyard will not be particularly noticeable from nearby along Cannon Road. Mature trees to the south and west of the site provide screening of lower elements of the facility from other nearby public views. The new SDG&E 230-kV switchyard will result in a minor visual change to the existing setting and will not result in a significant visual impact.

5.13.1.2 Increased Stack Height

As part of the project enhancements and refinements, the height of the two stacks has been increased to be 139 feet. The height of the remaining components of the CECP power block remain the same as included in the AFC. A set of 13 revised visual simulations have been prepared to illustrate the visual effect of this change (Revised Figures 1.2-3, 5.13-6 through 5.13-12, and Revised Figures DR67c, DR68-5a, DR68-5b, DR68-6, and DR111). As shown in this set of images, the project will be somewhat more visible than portrayed in the original visual simulations. This change will be most noticeable to the public when the project is seen from nearby locations directly adjacent to the project site, such as the railroad corridor view portrayed in Revised Figures DR68-5a and DR68-5b. This perspective is representative of rail passenger views that would be experienced briefly from the east side of upper train decks. These close-range views of the project would be brief and would occur within the context of landscape that includes the existing power plant and transmission facilities. When seen from other viewing locations, the increased stack height would not be particularly noticeable. For example, mature vegetation provides considerable screening in the view from Harbor Drive looking south, presented as Revised Figure 5.13-10.

Conclusion As shown in the revised simulations, the increase in CECP stack height will be most noticeable in the close-range views from the railroad corridor, which provide only a brief-duration view to rail passengers that will occur within the context of the existing power plant and transmission facilities. When seen from other viewing locations, the increased stack height would not be particularly noticeable. For example, mature vegetation provides considerable screening of the CECP, and the CECP with the project enhancements and refinements will not result in a significant visual impact.


Existing View from Encina Power Plant Site


Visual Simulation of Proposed Project

For viewpoint location refer to
Figure DR67a-2 Viewpoint S-9

Stack height is shown at 139 feet

REVISED FIGURE DR67c
ENCINA POWER PLANT SITE
INTERNAL ROADWAY
EXISTING VIEW AND VISUAL SIMULATION
CARSLBAD ENERGY CENTER PROJECT

ENVIRONMENTAL VISION
062508

CH2MHILL

Existing View from Train (Approximate)

Visual Simulation of Proposed Project without Landscaping

For viewpoint location refer to
Figure DR67a-2 Viewpoint S-7

Stack height is shown at 139 feet

REVISED FIGURE DR68-5a
REPRESENTATIVE PASSENGER TRAIN VIEW
EXISTING VIEW AND VISUAL SIMULATION (NO LANDSCAPING)

CARSLBAD ENERGY CENTER PROJECT

ENVIRONMENTAL VISION

062508

CH2MHILL

Existing View from Train (Approximate)

Visual Simulation of Proposed Project with Landscaping

For viewpoint location refer to
Figure DR67a-2 Viewpoint S-7

Stack height is shown at 139 feet

FREVISED IGURE DR68-5b
REPRESENTATIVE PASSENGER TRAIN VIEW
EXISTING VIEW AND VISUAL SIMULATION (WITH LANDSCAPING)

CARSLBAD ENERGY CENTER PROJECT

ENVIRONMENTAL VISION
062508

CH2MHILL


Existing View from Proposed Coastal Rail Trail

Visual Simulation of Proposed Project

For viewpoint location refer to
Figure DR67a-2 Viewpoint S-5

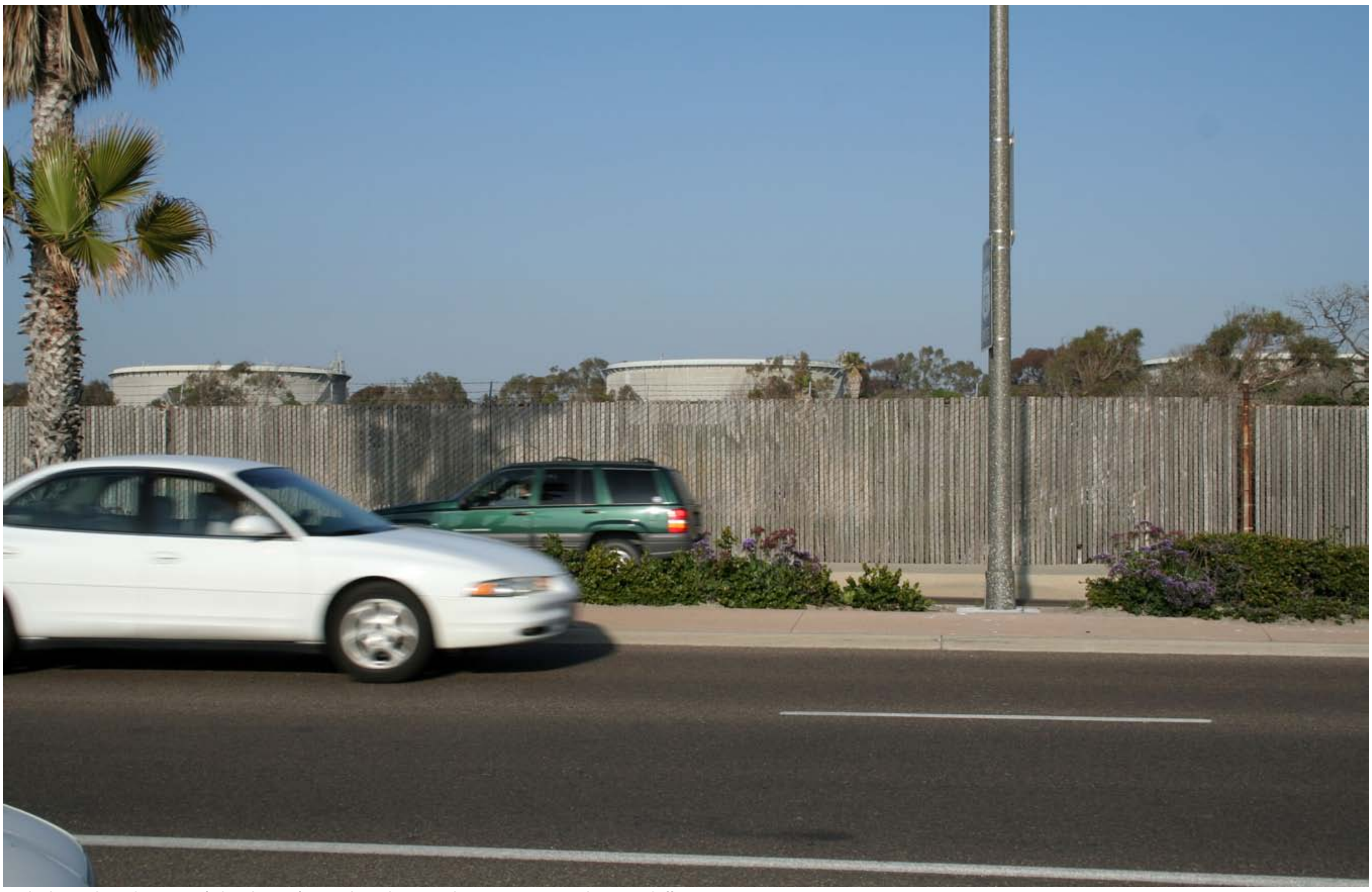
Stack height is shown at 139 feet

REVISED FIGURE DR68-6
FUTURE COASTAL RAIL TRAIL
EXISTING VIEW AND VISUAL SIMULATION

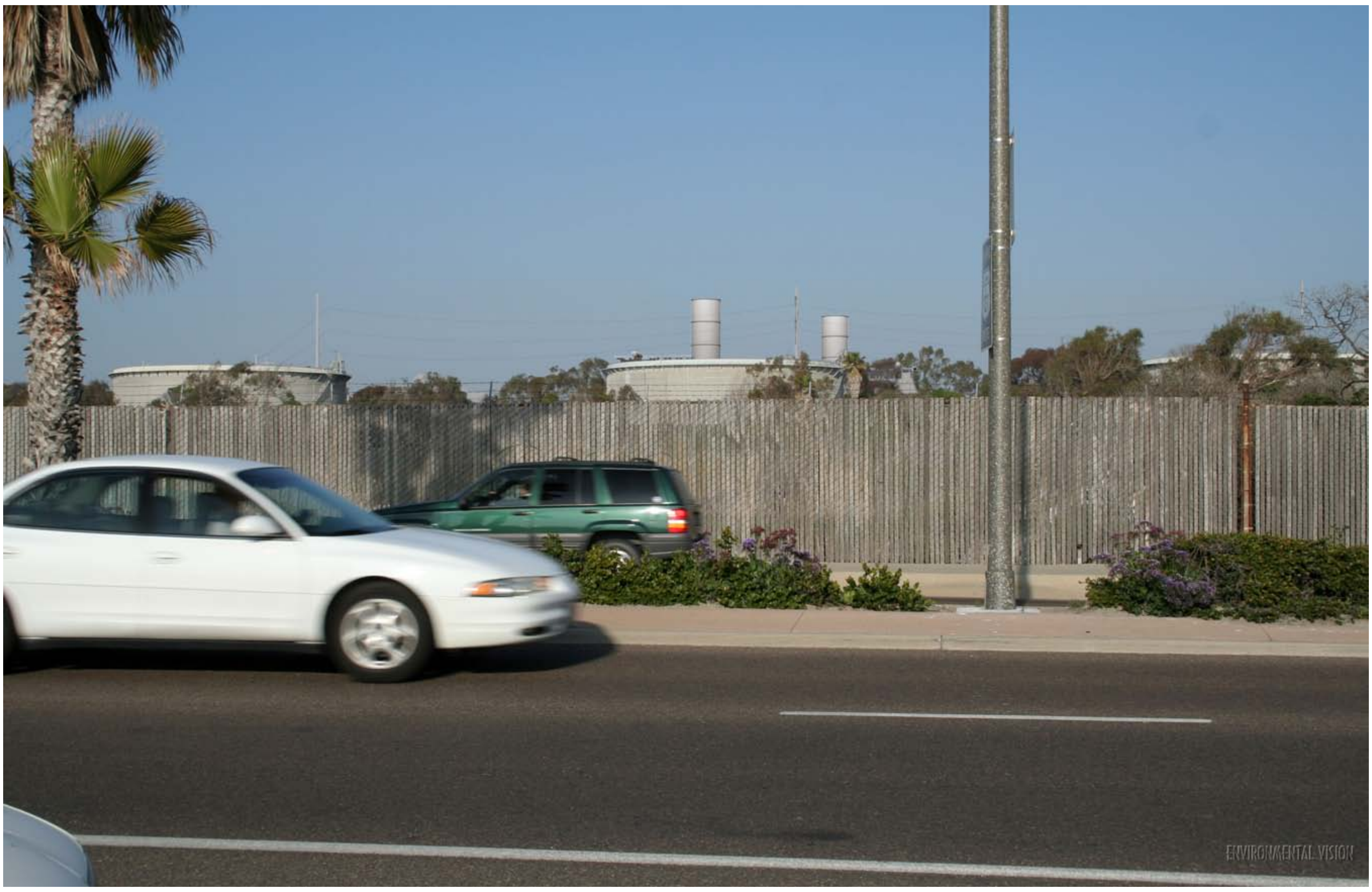
CARSLBAD ENERGY CENTER PROJECT

ENVIRONMENTAL VISION
070308

CH2MHILL



Existing View from Calsbad Boulevard at the Encina Power Station outfall



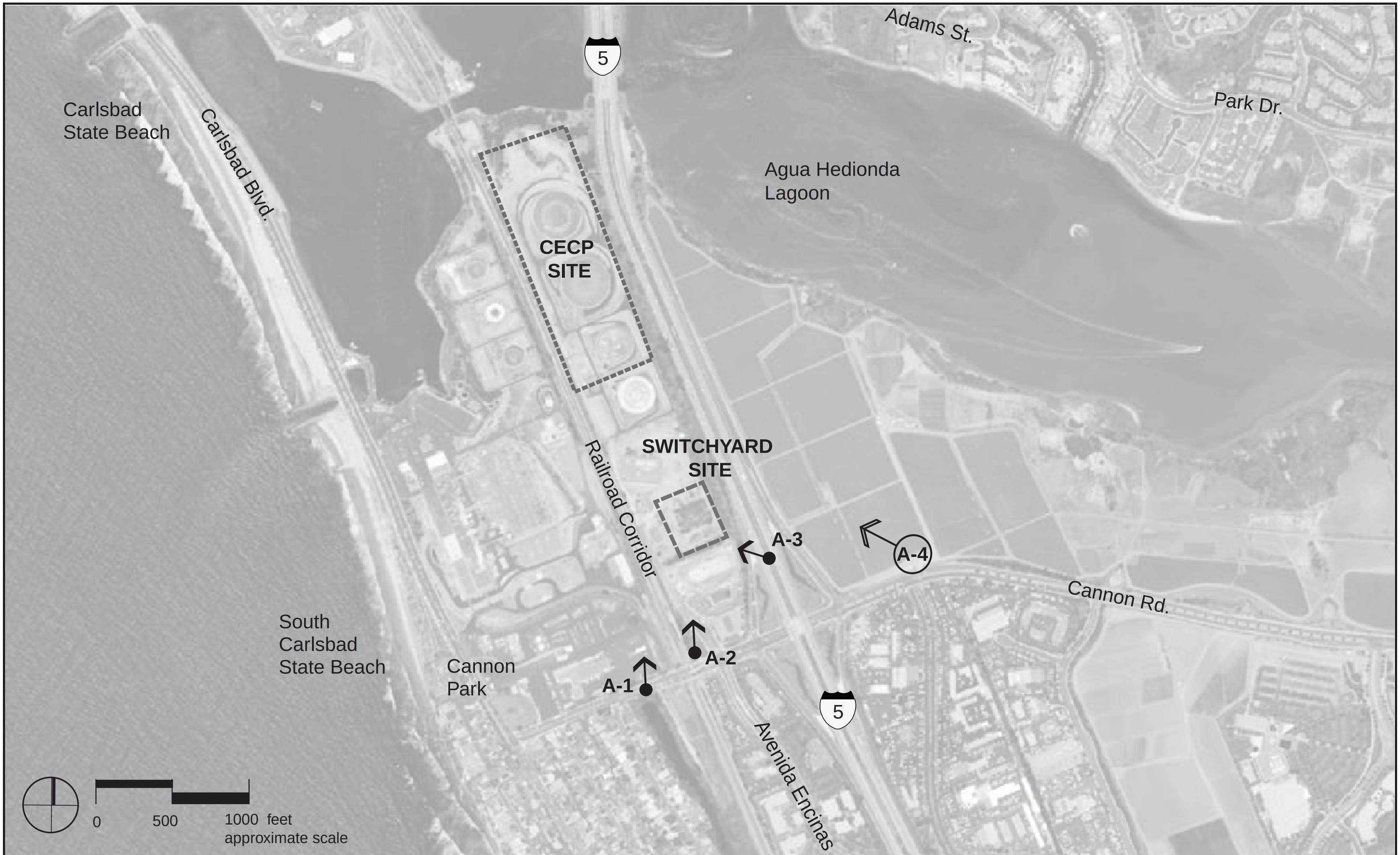
Visual Simulation of Proposed Project

Stack height is shown at 139 feet

REVISED FIGURE DR111
ENCINA POWER STATION OUTFALL
CARLSBAD BOULEVARD
EXISTING VIEW AND VISUAL SIMULATION
CARSLBAD ENERGY CENTER PROJECT

ENVIRONMENTAL VISION
062508

CH2MHILL



This figure shows viewpoint locations for 4 new photographs looking toward the new SDGE 230kV Switchyard site. These photos supplement a set of 31 photos presented in the AFC (Figures 5.13-4 and 5.13-5). This map is an enlarged portion of the AFC Figure 5.13-3

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A-4 **Switchyard Simulation Viewpoint**

A-1 **Photo Viewpoint**

NEW FIGURE 5.13-3A
NEW SDG&E 230 kV SWITCHYARD PHOTO VIEWPOINT LOCATIONS
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CALIFORNIA

CH2MHILL

EY072007001SAC Figure_5.13-3a.ai 07/21/2008 tdaus

A-1. Cannon Boulevard looking north

A-2. Mini-park on Cannon Road and Avenida Encinas

A-3. Interstate 5 northbound looking northwest

A-4. Strawberry fields along Cannon Road looking northwest

NEW FIGURE 5.13-4H
VIEWS TOWARD NEW SDG&E
230 Kv SWITCHYARD SITE
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CALIFORNIA

Refer to Figure A-1 for photo viewpoint locations

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EY072007001SAC Figure_5.13-4h.ai 07/21/2008 tdaus


Existing View from Carlsbad Boulevard at Agua Hedionda Lagoon looking southeast


Visual Simulation of Proposed Project

Stack height is shown at 139 feet

REVISED FIGURE 5.13-6 - KOP 1
CARLSBAD BOULEVARD AT LAGOON
EXISTING VIEW AND VISUAL SIMULATION

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Existing View from Pannonia Trail at Capri Park looking southwest

Visual Simulation of Proposed Project

Stack height is shown at 139 feet

REVISED FIGURE 5.13-7 - KOP 2
PANNONIA TRAIL AT CAPRI PARK
EXISTING VIEW AND VISUAL SIMULATION

CARLSBAD ENERGY CENTER PROJECT

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Existing View fromend of Cove Drive looking southwest

Visual Simulation of Proposed Project

Stack height is shown at 139 feet

REVISED FIGURE 5.13-8 - KOP3
END OF COVE DRIVE
EXISTING VIEW AND VISUAL SIMULATION

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Existing View from end of Hoover Street looking southwest

Visual Simulation of Proposed Project

Stack height is shown at 139 feet

REVISED FIGURE 5.13-9 - KOP 4
HOOVER STREET
EXISTING VIEW AND VISUAL SIMULATION

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Existing View from Harbor Drive looking south

Visual Simulation of Proposed Project

Stack height is shown at 139 feet

REVISED FIGURE 5.13-10 - KOP 5
HARBOR DRIVE
EXISTING VIEW AND VISUAL SIMULATION

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Existing View from southbound Interstate 5 looking south

Visual Simulation of Proposed Project

Stack height is shown at 139 feet

REVISED FIGURE 5.13-11 - KOP 6
SOUTHBOUND INTERSTATE 5
EXISTING VIEW AND VISUAL SIMULATION

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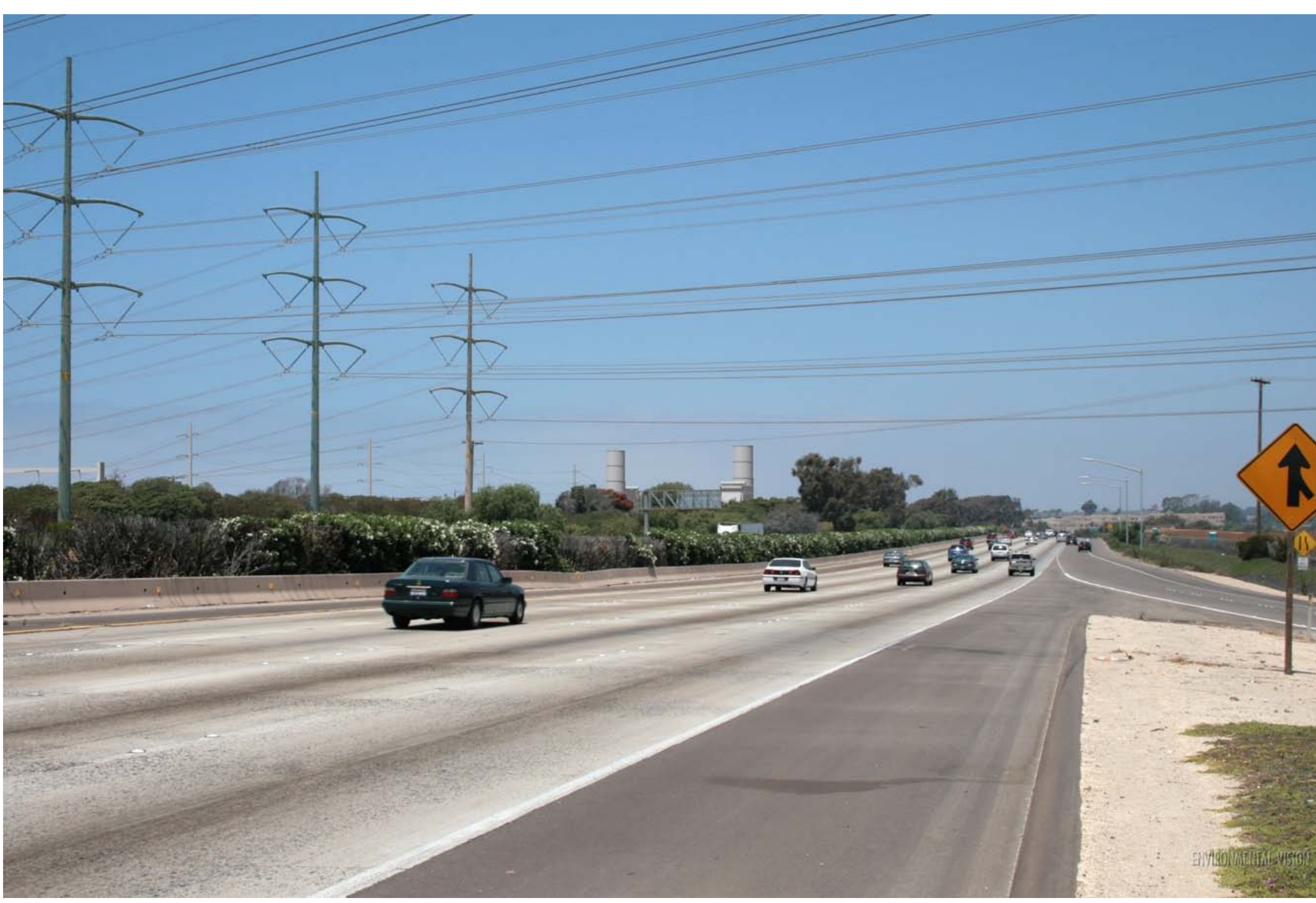
Existing View from northbound Interstate 5 looking northwest



Visual Simulation of Proposed Project

Stack height is shown at 139 feet

REVISED FIGURE 5.13-12 - KOP 7
NORTHBOUND INTERSTATE 5
EXISTING VIEW AND VISUAL SIMULATION

CARLSBAD ENERGY CENTER PROJECT

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Existing View from Strawberry Fields along Cannon Road

Visual Simulation of Substation

For viewpoint location refer to
Figure A-1 Viewpoint A-4

NEW FIGURE 5.13-13
NEW SDG&E 230 kV SWITCHYARD
EXISTING VIEW AND VISUAL SIMULATION
CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CALIFORNIA

ENVIRONMENTAL VISION

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EY072007001SAC Figure_5.13-13.ai 07/21/2008 tdaus

5.14 Waste Management

5.14.1 Introduction

While the project enhancements and refinements do not affect some of the environmental analyses described in the AFC, the ocean-water purification system, new SDG&E 230-kV switchyard, and tank demolition and remediation will result in minor changes to waste management. In particular, the ocean-water purification system will generate additional waste during operations, and the tank demolition and remediation will generate additional wastes during the construction phase of the CECP. The following subsections describe the refined waste management impact analysis. Based on the analysis, the project enhancements and refinements will have limited additional impact on waste management, and the CECP will continue to comply with all applicable LORS. Further, the proposed Conditions of Certification will ensure that any potential waste management impacts are effectively mitigated to less than significant.

5.14.2 Laws, Ordinances, Regulations, and Standards

The federal, state, and local LORS applicable to waste management and conformance are generally the same as described in the AFC. For a complete description of the applicable waste management LORS, refer to Section 5.14.2 of the AFC. The only additional LORS are related to the ocean-water purification system's first-stage reverse osmosis brine waste discharge (described in Section 5.15) and tank demolition and remediation (described below).

5.14.2.1 Tank Demolition and Remediation – Additional LORS County of San Diego, Department of Environmental Health

The Applicant has agreed to enter into the Voluntary Assessment Plan program through the San Diego County DEH Site Assessment and Mitigation Division for the demolition of Tanks 5, 6, and 7 and for associated remediation after demolition. Under this program, DEH will manage the development and implementation of the remediation work plan. The Regional Water Quality Control Board – San Diego region has requested copies of work plans and sampling results that are provided to DEH. In addition, work plans documenting management of hazardous materials, wastes, and recyclable materials for the demolition of Tanks 5, 6, and 7 would be provided to DEH's Hazard Materials Division for review and approval.

5.14.2.2 Tank Demolition and Remediation – County of San Diego, Department of Public Works

County of San Diego Ordinance No. 9840 outlines requirements for construction and debris management, or a Construction and Demolition Materials Diversion Program, to comply with Public Resources Code Section 41780, et seq., also known as the Integrated Waste Management Act. Effective April 21, 2007, debris from construction and demolition projects must be diverted away from landfill disposal in the unincorporated areas of San Diego County. The ordinance applies to all projects in which the total square footage of demolition and/or construction is equal to or greater than 40,000 square feet. For projects meeting this threshold, the project applicant must submit a completed Debris Management Plan (DMP) with an application for a building permit and/or demolition permit to the San Diego County Department of Public Works for review and approval.

Compliance with this ordinance requires that 90 percent of inert materials and 70 percent of all other materials must be recycled from demolition projects. Although the City of Carlsbad and the CECP site are not an unincorporated area of San Diego County, the CECP intends to comply with this requirement. Any debris from tank demolition or other construction-related waste from existing component decommissioning will be shipped out for disposal, most likely to an approved San Diego County landfill.

A DMP permittee must maintain a daily log of all debris that leaves the site along with receipts from any recycling center, vendor, green materials operation, or disposal or transfer station facility that accepts debris from the DMP permittee. The DMP permittee is required to submit quarterly reports documenting compliance with the approved DMP to the County until 180 days after the County issues a certificate of occupancy. The County has the right to inspect the site during normal business hours without notice.

5.14.3 Affected Environment

This section provides a discussion of the waste management issues associated with the implementation of the ocean-water purification system, tank demolition and remediation, and construction of the new SDG&E 230-kV switchyard. This section also discusses the additional information related to the need to remove or otherwise treat contaminated soil at the site associated with the tank demolition and remediation. This information is important in understanding the expected soil removal and remediation activities associated with the tank demolition. In addition to the description of soil characteristics, preliminary information regarding the tank demolition is also included in this section.

5.14.3.1 Ocean-water Purification System

As described in Section 2.0, the CECP now proposes to purify ocean water to provide a reliable supply of source water required for the CECP's processes, including evaporative cooling water, miscellaneous plant uses (e.g., equipment wash water), and possibly onsite irrigation. Generation of the source water through the ocean-water purification system will be essentially the same process originally proposed in the CECP AFC for the demineralization of the City's reclaimed water. However, the first-stage reverse osmosis treated water (i.e., the desalinated water) will pass through a second-stage reverse osmosis system, and the second-stage reverse osmosis permeate will be further treated using ion exchange to produce pure water suitable for the CECP processes.

5.14.3.2 Tank Demolition and Remediation Tank Demolition and Remediation

To accommodate the CECP, existing Tanks 5, 6, and 7 must be demolished, and the underlying soil must be remediated. Initially, the demolition of Tanks 5, 6, and 7 was not included as part of the AFC. It was expected that the tank demolition would be conducted under permits from the City and the CCC as part of an action that would have been separate from the processing and licensing of the CECP by the CEC. As planned at that time of the filing of the AFC with the CEC in September 2007, the tank demolition and remediation would have been conducted prior to construction of the CECP. Cabrillo Power I LLC submitted tank demolition permits to the City and the CCC. While CCC issued a demolition permit, the City of Carlsbad has requested that CEC take jurisdiction for tank demolition as part of the CEC licenses for CECP. The CEC decision will authorize tank demolition but, as discussed in Section 2.0, DEH will retain jurisdiction for approval and implementation of the work plan for remediation. A copy of the *Carlsbad Energy Center project - Fuel Oil Storage Tank Removal and Verification Sampling Work Plan Encina Power Station, Carlsbad, California, Voluntary Assistance Program Case Number H13941-004* is included as New Appendix 2H. This work plan addresses soil removal and verification sampling. A work plan for the physical removal of the tanks will also be prepared for and will be submitted to the DEH Hazardous Materials Division for review and approval, and will also be docketed with the CEC when available.

Section 2.0 includes a detailed description of the history of service of Tanks 5, 6, and 7, a description of the tanks and ancillary equipment, as well as expected demolition and remediation activities.

5.14.3.3 New SDG&E 230-kV Switchyard

Construction and operation of the proposed 230-kV switchyard will be similar to the electrical grid interconnection discussions provided in the AFC. The interconnection facilities required to safely and reliably interconnect the project include the installation of a termination stand and trench, conduit system, and underground cable from substation fence line to termination stand. Ultimate construction will include four bays in a breaker-and-a-half arrangement suitable for terminating eight lines and removal of unused equipment in the existing Encina 230-kV switchyard. No new or additional waste generation beyond that identified in the CECP AFC will result from implementation of this enhancement component.

5.14.4 Environmental Analysis

This section discusses the additional nonhazardous and hazardous waste streams associated with the ocean-water purification system, new SDG&E 230-kV switchyard, and tank demolition and remediation for construction and operation. Refer to Section 5.14 of the AFC for waste stream information related to the CECP Tables 2.1, 2.2, 5.14-1, and 5.14-2 in the AFC provided information regarding the additional wastes generated from tank demolition and remediation and from construction and operation of the ocean-water purification system. In addition, pursuant to CEC staff direction, New Appendix 5.14B (Tables 5.14-1A, 5.14-2A, 5.14.3A) includes the combined waste generation of the CECP, including the enhancement components.

5.14.4.1 Tank Demolition and Remediation – Construction

The nonhazardous waste streams generated during tank demolition are related to wastes associated with the dismantling of the tanks and the removal of approximately 2 to 3 feet of soil beneath the tanks. A preliminary description of the tank demolition is provided above. The expected waste streams will be similar to those discussed in Section 5.14 of the AFC and the quantities and composition of these additional waste streams are presented in Table 5.14-1.

Tank demolition and associated soil remediation activities will occur over an approximately 3-month period, and the work will be completed prior to the start of the power plant construction activities (i.e., site preparation, berm work, installation of major equipment, etc). As part of the tank demolition/soil remediation activities, approximately 7,500 cubic yards of soil (~11,300 tons) and approximately 3,800 tons of metal/debris are expected to be hauled offsite. The soil and debris are expected to be hauled to the Otay Landfill. It is expected that most of the soil will be able to be tested and qualified to be used as daily cover pending compliance with state mandated requirements for soils known to contain hydrocarbons. The metal will be hauled to an appropriate scrap metal recycling center. The use of excavated soil generated by the remediation process as daily cover at the Otay Landfill is classified as recycling as daily cover is not defined as waste. If the soil is not accepted at the Otay Landfill, soil may be recycled at a thermal treatment facility in Adelanto, California or at another permitted treatment facility. Truck hauling will be the primary method for transporting the soil and metal/debris. The oil tank demolition/soil remediation activities are scheduled to occur 9 hours per day, 5 days per week. As part of the Data Response 113, detailed emission calculations, including the number of workers, number of truck trips, and number/type of demolition equipment, have been provided to the CEC.

TABLE 5.14-1
Wastes Generated during the Construction Phase of Tank Demolition and Remediation at the CECP

Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Scrap Plate	Demolition	Metal Composites	3,800 tons	Nonhazardous	Recycle and/or dispose of in a Class II or III landfill
Concrete Rings	Demolition	Concrete	1,100 cubic yards	Nonhazardous	Recycle and/or dispose of in a Class II or III landfill
Construction and Demolition Materials	Demolition	Miscellaneous	900 cubic yard	Nonhazardous	Recycle and/or dispose of in a Class II or III landfill
Entrained Oil	Demolition	Petroleum Hydrocarbon	16,000–32,000 gallons (64-128 tons)	Nonhazardous	Recycle and/or dispose of in a Class II or III landfill
Pipe with Entrained Oil	Demolition	Petroleum laden metal	350 tons	Nonhazardous	Recycle and/or dispose of in a Class II or III landfill
Asbestos	Demolition	Asbestos laden construction debris	60 tons	Hazardous	Recycle at a permitted TSDF
Asphalt Topping	Demolition	Asphalt	2,000 cubic yards	Nonhazardous	Recycle and/or dispose of in a Class II or III landfill

Note: Containers include less than 5-gallon containers and 55-gallon drums or totes.

5.14.4.2 Tank Demolition and Remediation - Operation

There will not be any operational wastes associated with tank demolition and remediation.

5.14.4.3 Ocean-water Purification System - Construction

Waste streams generated during construction of the ocean-water purification system will be similar to the types of wastes described in Section 5.14 of the AFC. Refer to Section 2.0,

Table 5.14-2, and the following discussion for information related to the nonhazardous and hazardous waste streams associated with operation of the ocean-water purification system.

5.14.4.4 Ocean-water Purification System - Operation

As described in Section 2.0, the proposed ocean-water purification system will generate waste streams associated with the ultrafiltration and first-stage reverse osmosis reject processes. These wastes are presented in Table 5.14-2.

As part of the ocean-water purification system, an ultrafiltration system will be installed as part of the reverse osmosis process. This system will be installed upstream of the first-stage reverse osmosis processing with a storage tank to allow for continuous operation regardless of power plant operating mode. As part of the purification process, a dewatering system processes the suspended solid waste stream from the ultrafilter, recycling liquids to the ocean-water tank and transporting insoluble cake to an onsite dumpster for offsite disposal. The remaining water treatment system for power plant operation remains functionally the same as described in the AFC.

The ultrafiltration system will produce an aqueous waste stream highly concentrated with suspended and settled solids. The concentrated waste stream will be treated onsite using a dewatering process that separates the liquids from the solids. The liquids are recycled back to the ocean-water storage tank. The resultant filtered solids cake would be suitable for disposal as a solid waste at a Class II or Class III landfill. Dry filtered solid wastes will range from 150 to 300 pounds per day, and wet filtered solid wastes will range from 300 to 600 pounds per day. It is expected that the insoluble cake wastes, both wet and dry, would be hauled offsite once a month to a Class II or Class III landfill. Additional information regarding the proposed ocean-water purification system is provided in Section 5.15 of this document. Information regarding the use and storage of chemicals required to operate the purification system is included in Section 5.12 of this document.

TABLE 5.14-2
Hazardous Wastes Generated during Operation of the Ocean-Water Purification System at the CECP

	Origin	Composition	Estimated Quantity	Classification	Disposal
Filtered Cake (dry)	Operational waste from water purification system	Heavy metals and sludge	150-300 pounds/ day	Hazardous/ Nonhazardous	Class II or III Landfill
Filtered Cake (wet)	Operational waste from water purification system	Heavy metals and liquefied sludge	300-600 pounds/ day	Hazardous/ Nonhazardous	Class II or III Landfill

Refer to Section 5.2 and Section 5.15 of this document for information regarding the potential impacts to marine water quality and marine biology associated with the wastewater discharge associated with operation of the ocean-water purification system. The analysis presented in these sections concludes that the increase in salinity associated with the wastewater discharge to the EPS ocean outfall as a result of operation of the CECP ocean-water desalination process would result in less-than-significant impacts.

5.14.5 Waste Disposal Sites

It is expected that the additional solid waste generated from the tank demolition and ocean-water purification system will be accommodated within the Class I, II, and III landfills identified in Section 5.14 of the AFC (subject to applicable post-generation testing and landfill waste requirements for the hydrocarbon-affected soils from demolition and the filter cake from operation of the ocean-water purification system). Consistent with Section 5.14 of the AFC, it is expected that the hazardous wastes, both solid and liquid, will be delivered to the identified permitted offsite treatment, storage, and disposal facilities. Approximately 11,300 tons of soil from the tank area that may be impacted with petroleum hydrocarbons from the prior practice of applying oil to soil directly underlying aboveground fuel-oil tanks such as Tanks 5, 6, and 7 will be sent to the Otay Landfill for use as daily cover as long as the total amount of petroleum hydrocarbons meet the landfill's requirements for use as daily cover. If the soil is not accepted at the Otay Landfill, soil may be recycled at TPS Technologies, a thermal treatment facility in Adelanto, California, or at another permitted treatment facility. Soil underlying the tanks will be classified to determine the appropriate management (e.g., to assess whether the soil could be reused onsite) or will be sent to either of the offsite recycling options discussed above. Otay Landfill has adequate capacity to accommodate this soil material (Garrido, 2008). If the soil is not acceptable at the Otay Landfill and is shipped to TPS for thermal treatment, the successfully treated soil would typically be used as road base or used in the production of asphalt mixed for roadways. TPS Technologies has adequate capacity to accommodate this soil material.

5.14.5.1 Hazardous Waste

As discussed in Section 5.14.4.3.2 of the AFC, hazardous waste generated at CECP will be stored onsite for less than 90 days. The waste will then be transported by a licensed hazardous waste transporter to a permitted hazardous waste treatment, storage, or disposal facility. These facilities vary considerably in what they are permitted to do with the hazardous waste they receive. Some can only store waste, some can treat the waste to recover usable products, and others can dispose of the waste by incineration, deep-well injection, or landfilling. (Note that incineration and deep-well injection are not permitted in California.) According to the Department of Toxic Substances Control, there are 61 facilities in California that can accept hazardous waste for treatment and recycling. For ultimate disposal, California has the three hazardous waste (Class I) landfills (described below). The closest commercial hazardous waste disposal facilities are the Clean Harbors Buttonwillow Landfill in Kern County and the Waste Management Kettleman Hills Facility, as described in Section 5.14 of the AFC.

5.14.5.2 Waste Management Methods and Mitigation

The handling and management of waste generated by the tank demolition and remediation and ocean-water purification system will follow the same hierarchical approach of source reduction, recycling, treatment, and disposal as described in Section 5.14 of the AFC.

5.14.6 Mitigation Measures

No additional mitigation beyond what was discussed in Section 5.14 of the AFC will be required to accommodate the tank demolition and remediation, ocean-water purification system, and construction of the proposed 230-kV switchyard.

5.14.7 Proposed Conditions of Certification

An additional Condition of Certification beyond what was discussed in Section 5.14 of the AFC is proposed to accommodate the ocean water purification system. This condition is discussed in Section 5.15 of this document.

5.14.8 Involved Agencies and Agency Contacts

Except as discussed above related to the involvement of the DEH, the Water Board, and additional SDAPCD requirements, no additional agencies beyond those identified in Section 5.14 of the AFC will be required to address the tank demolition and remediation and the ocean-water purification system.

5.14.9 Permits Required and Permit Schedule

The only new and different permit required as part of these project enhancements and refinements is an NPDES permit to be issued by the Water Board for the ocean-water purification system. This additional permit is discussed further in Section 5.15.

5.14.10 References

Additional references to support the tank demolition and proposed ocean water purification system are included below.

Garrido, Laine/Allied Waste Otay Landfill. 2008. Allied Waste Otay Landfill. Personal communication with John Putrich/CH2M HILL. June.

San Diego Gas and Electric (SDG&E). 2007. *Phase I Environmental Site Assessment*. Prepared by Fluor Daniel GTI. August.

5.15 Water Resources

Of the four components of the project enhancements and refinements, the ocean-water purification system, the demolition of the tanks and remediation activities, and the construction of the new SDG&E 230-kV switchyard affect the results of the water use and water quality impact analyses in the AFC. In addition, the tank demolition and remediation and the new SDG&E new 230-kV switchyard result in some minor changes to the stormwater analysis. The following sections provide the revised water resources impact analysis based on the changes resulting from the project enhancements and refinements. Based on this analysis, the project enhancements and refinements will have less-than-significant impacts on water resources, and the enhanced and refined CECP will comply with all applicable LORS. The proposed Conditions of Certification will ensure that any potential impacts to water resources are mitigated to a less than significant level.

The consideration of an ocean-water purification system (reverse osmosis) is an option to providing CCR Title 22 reclaimed water. The reject stream from the ocean-water purification system will be discharged to the ocean through the existing EPS discharge system. This component of the project enhancement/refinement is in response to the City's position that it does not have the capacity to provide the CECP with sufficient quantities of CCR Title 22 reclaimed water to meet the industrial water requirements for the project and the City's position that it has insufficient capacity to allow CECP to discharge the reject stream to the City's existing sanitary/industrial sewer system as proposed in the AFC. However, should an agreement be reached in time for CCR Title 22 reclaimed water to be used for CECP and for the City to accept the reject stream into the existing sanitary/industrial sewer system, the analysis included in the AFC and in the Data Response submittals provide the necessary information for CCR Title 22 reclaimed water to be used for the project and for the reject steam to be accepted into the existing sanitary/industrial sewer system.

5.15.1 Laws, Ordinances, Regulations, and Standards

The federal, state, and local LORS applicable to water resources for the project enhancements and refinements are generally the same as described in the AFC, with the addition of the California Ocean Plan, which is related to the optional ocean-water purification system.

5.15.1.1 Ocean Plan

The State Water Resources Control Board established objectives for the protection of marine water quality in the California Ocean Plan. The Ocean Plan sets forth limits or levels of water quality characteristics for ocean waters to ensure the reasonable protection of beneficial uses and the prevention of nuisance. The Ocean Plan contains a procedure for establishing effluent limitations based on ocean water-quality objectives. Effluent limitations are applied outside a zone of initial dilution and are calculated based on, among other things, ocean-water concentration and minimum probable initial dilution. The point source discharge of waste to ocean waters shall not cause violation of these objectives. The Applicant is preparing a Report of Waste Discharge (ROWD) and a National Pollutant Discharge Elimination System (NPDES) permit application and will submit to the RWQCB and docket with the CEC when it is available.

5.15.2 Affected Environment

The CECP site is located within the existing EPS site, which is adjacent to the AHL and across Carlsbad Boulevard from the Pacific Ocean and Carlsbad State Beach. The Water Board issued an NPDES permit for EPS to intake and discharge a maximum of 857 mgd of ocean water for use as once-through cooling water for the EPS's Generating Units 1 through 5. The EPS is also permitted to treat up to 1.44 mgd of ocean water by reverse osmosis to supplement the power station's municipal water supply used in plant operations in the event of a fresh water shortage.

As part of the CECP, the existing EPS Generating Units 1, 2, and 3 will be retired. The retirements will occur upon the successful commercial operation of the new CECP. The retirement of EPS Generating Units 1, 2, and 3 will create substantial environmental benefits, including eliminating the intake and discharge of 225 mgd of cooling water (ocean water).

5.15.2.1 Water Supply, Use, and Disposal

This section characterizes the quantity of the water required for power generation by the CECP, the sources of the water supply and wastewater discharge, and treatment and disposal methods.

Water Supply If reclaimed water is not available, purified ocean water will be used for CECP's process water, evaporative cooling water, miscellaneous plant uses (e.g., equipment wash water), and possibly onsite irrigation. Purification will be provided by an ultrafilter and by two stages of reverse osmosis. The intake for the ocean-water purification unit will be from the existing EPS discharge channel. Maximum daily intake of ocean water for purification for CECP would range between 604,500 gpd, without PAG, and 1.22 mgd, with PAG operating 8 hours per day. Revised Figures 2.2-6a *CECP Water Balance with 8 Hr/Day Power Augmentation*, and Revised Figure 2.2-6b *CECP Water Balance-No Power Augmentation* show the revised water balance diagrams for the CECP. Emergency water supply for fire protection would be supplied to the CECP site by the City of Carlsbad through existing water supply infrastructure at the site, which consists of a 10-inch pipeline running immediately adjacent to the site on the west side.

Water Use As discussed in Section 5.15 of the AFC, water requirements for CECP are presented in Revised Table 5.15-1. Annual average water use assumes that the CECP will operate on a 40-percent capacity factor. The 40-percent capacity factor is a function of air emissions and will be permitted though the air permits for CECP issued by the SDAPCD. Under these annualized conditions and in the event that the City does not provide reclaimed water, CECP will require approximately 271 acre-feet of ocean water per year.

REVISED TABLE 5.15-1
Daily and Annual Water Use for CECP Operations

Water Use	Water Source	Use (gpm)		Annual Use (afy)
		Average	Maximum	
Industrial Processes	Ocean	420	848	271
Potable Water (non-fire)	City of Carlsbad	12	12	19

afy = acre-feet per year (based on an annual operation of 3,504 hours/year at full plant output).

In addition to the above, water will be used during construction for dust and erosion control, equipment washing, and other short-term uses in similar amounts as described in the AFC.

Wastewater Discharges and Disposal This section characterizes the volume and quality of wastewater that would be generated by CECP if ocean-water purification required and the method of disposal for CECP wastewater. Estimated instantaneous and annual wastewater discharge rates are provided in New Table 5.15-2.

NEW TABLE 5.15-2
Operational Wastewater Discharges from CECP

Waste Discharge Stream	Discharge Location	Discharge (gpm)		Annual Discharge (mgy)
		Average	Maximum	
Reject from reverse osmosis units	Discharged to the ocean	275	505	58
Discharge from miscellaneous plant drains	Disposed of offsite	12	12	2.5

mgy = million gallons per year (based on an annual operation of 3,504 hours/year at full plant output).

Industrial Waste Discharges As part of the ocean-water purification system, an ultrafiltration system will be installed upstream of the first-stage reverse osmosis processing with a storage tank to permit continuous operation regardless of power plant operating mode. The service water tank receiving first-stage reverse osmosis will be increased in capacity to continue to store water regardless of plant operation. First-stage reverse osmosis will discharge reject water to the existing EPS discharge channel by pumps on board the water treatment trailers or an onsite pump system.

A dewatering system processes the suspended solids waste stream from the ultrafilter, recycles liquids to the ocean-water tank and transports insoluble cake to a dumpster for offsite disposal, as discussed in Section 5.14 of this document. The remaining water treatment system for power plant operation remains functionally the same as described in the AFC. CECP will use highly purified (demineralized) water for producing steam. A system of reverse osmosis units and mixed-bed ion-exchange demineralizers will be used for producing high-purity water.

As previously discussed, the CECP ocean-water purification unit will draw source water from the existing EPS discharge channel. The source water intake flow for the CECP will be 3,000 gpm. The concentration factor of the first-stage reverse osmosis brine is estimated to be 1.679. Based on an average ambient ocean salinity of 33.5 ppt, the salinity of the first-stage reverse osmosis brine is estimated to average 56.3 ppt. The first-stage reverse osmosis brine will be further diluted by mixing the reverse osmosis reject wastestream with residual source water from the 3,000-gpm intake flow prior to being discharged back to the EPS discharge channel. New Table 5.15-3 shows the estimated volume and salinity of the first-stage reverse osmosis reject wastestream based on 3,000-gpm intake flow.

NEW TABLE 5.15-3
CECP First Stage Reverse Osmosis Reject Waste Stream

First-Stage Reverse Osmosis Reject Properties[a]	Operating Condition	
	With PAG	**Without PAG**
Ocean-water purification system draw from source water intake of 3,000 gpm	848 gpm	420 gpm
Residual source water for dilution prior to discharge to EPS discharge channel	2,152 gpm	2,580 gpm
Reverse osmosis reject volume	505 gpm	275 gpm
Dilution factor from mixing reverse osmosis reject with residual source water[b]	4.26:1	9.38:1
Reverse osmosis reject salinity prior to dilution[c]	563 ppt	563 ppt
Reverse osmosis reject salinity after dilution and at the point of discharge into the EPS discharge channel	37.8 ppt	35.7 ppt
CECP combined discharge to EPS cooling water discharge channel	2,657 gpm	2,855 gpm

[a] Refer to the water balances.
[b] Dilution factor equals residual source water volume: reverse osmosis reject volume.
[c] Assumes intake ocean water with average salinity of 33.5 ppt and concentration factor of 1.679.

As previously discussed in Section 2.0 of this document, there will be no onsite preparation, regeneration, or disposal of the CECP's ion-exchange system's spent resin. The CECP uses a completely contained mobile modular demineralization system provided and maintained by a third-party vendor. The vendor will deliver the mobile demineralizer unit to the site, set the enclosed trailer in place, and connect the demineralization system to the second-stage reverse osmosis treatment unit's permeate. The Applicant proposes using one demineralizer trailer to produce 200 gpm of high-purity water (<0.05 ppm TDS) from ocean water containing approximately 33 ppt TDS. Once the resin system is spent, the vendor will remove the spent resin unit for regeneration offsite and replace the spent system with a fresh, regenerated resin trailer.

Depending upon the removal efficiency of the reverse osmosis treatment, the mobile demineralization unit can treat between 17 million to 26 million gallons of second-stage reverse osmosis permeate before becoming spent. Assuming CECP will be operated with a 40-percent capacity factor, the demineralization trailers will need to be replaced every 150 to 225 days.

Wastewater from miscellaneous CECP uses, evaporative coolers, and HRSG blowdown will be recycled to the ocean-water tank for reuse. The CECP wastewaters will be treated by filtration and oil/water separation prior to recycling and reuse.

Domestic Wastewater Disposal As discussed in the AFC, the CECP power plant will be operated remotely from the Control Building located within the existing EPS. Onsite personnel activities at the CECP site will be limited to routine equipment monitoring, inspection, and maintenance. Sanitary facilities (i.e., toilets and hand wash stations), personnel safety equipment (i.e., eye wash stations and safety showers), as well as drinking water fountains are proposed to be discharged to the City sanitary sewer system. In the event that the City does not accept sanitary waste from the CECP, wastewater disposal will be provided at the CECP site as self-contained mobile units. The mobile units (or the wastewater collected and contained within the mobile units) would be transported to the EPS for disposal to the existing sanitary sewer system that is connected to the Encina Wastewater Authority wastewater treatment plant. Alternatively, the generated wastewater collected in the mobile units could be pumped out by a licensed domestic waste hauler and disposed of to the local sanitary sewer system at a permitted domestic wastewater disposal site.

5.15.3 Environmental Analysis

Significance criteria for water resources are derived from the California Environmental Quality Act Appendix G checklist. The project would be considered to have a potentially significant effect if it would:

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or offsite or in flooding on- or offsite.
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.
- Violate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality.

- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows.
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam.
- Cause inundation by seiche, tsunami, or mudflow.

5.15.3.1 Stormwater Quality (Construction Phase)

During construction, approximately 23 acres of land associated with the CECP site and additional areas along the linear corridors would be disturbed. In addition, as part of the construction of the new SDG&E 230-kV switchyard component of the project enhancement and refinements, an additional 13.5 acres of land will be disturbed, for a total refined CECP construction disturbance of 36.5 acres. Surface water impacts are generally the same as described in the AFC and in Section 5.11 of this document). As a result of the project enhancements and refinements, the previously prepared and docketed CECP Construction SWPPP will be updated to reflect the refined project. BMPs for erosion control will be implemented, as described in the Draft SWPPP. Successful implementation of the SWPPP will ensure that CECP construction impacts to water resources are mitigated to less-than-significant levels.

5.15.3.2 Stormwater Quality (Operations Phase)

Surface water impacts are generally the same as described in the CECP AFC. As a result of the project enhancements and refinements, the previously prepared and docketed CECP Industrial SWPPP will be updated to reflect the refined project. Operational BMPs will be implemented, as described in the Draft Industrial SWPPP. Successful implementation of the CECP's Industrial SWPPP will ensure that operational impacts to water resources are mitigated to less-than-significant levels.

5.15.3.3 Waste Discharge

Under normal conditions, the CECP reverse osmosis reject stream will be mixed with discharge from EPS Generating Units 4 and 5. For an average ambient ocean salinity of 33.5 ppt, the salinity of the brine reject from the CECP closed-cycle cooling system will average 56.3 ppt. The brine from CECP closed-cycle cooling will be mixed with a residual source water throughput of 2,152 gpm from the EPS Units 4 and 5, producing a combined discharge of 2,657 gpm through the existing EPS discharge channel. The combined discharge in the discharge channel will have an average salinity of 37.8 ppt, which is less than 0.2 percent above background salinity concentrations. When EPS Generating Units 4 and 5 are not operating, dilution of the CECP reverse osmosis reject brine to the ocean would be 4.26:1, based on an intake volume of 3,000 gpm.

In the nearshore environment, salinity values in the brine plume would not approach the threshold (38 to 40 ppt) for hyper-salinity tolerance of local marine organisms. Kelp beds and tide pools to the south of the EPS discharge would experience salinity elevations from the brine plume that is no greater than what occurs inter-annually under natural seasonal fluctuations of ocean salinity. Therefore, the increase in salinity as a result of operation of the ocean-water purification unit would be a less-than-significant impact. For more information, see Appendix 5.2E .

5.15.4 Mitigation Measures

These mitigation measures are the same as described in the AFC.

5.15.5 Proposed Monitoring Plans and Compliance Verification Procedures

Routine monitoring and compliance verification would be required as part of the industrial discharge permit and construction/operation stormwater NPDES permitting of the project. These monitoring plans and compliance verification processes are the same as described in the AFC.

5.15.6 Proposed Conditions for Certification

This section describes a proposed Condition of Certification as a result of the project enhancements and refinements. Water Res-3 reflects the need for Water Board approval of ocean discharge if ocean-water purification is implemented.

WATER RES-3: In the event that reclaimed water is not available for the CECP, prepare and submit a Report of Waste Discharge and NPDES Permit Application to the Water Board for authorization to discharge reverse osmosis brine wastes to the EPS cooling water discharge channel and the Pacific Ocean.

Verification: Two weeks prior to operation of the CECP ocean-water purification process, the Applicant will submit to the CEC Construction Project Manager a copy of the CECP's approved NPDES permit.

Note: The Applicant is preparing a Report of Water Discharge and NPDES Permit Application and will submit to the Water Board and will docket with the CEC when they are available.

5.15.7 Cumulative Effects

Cumulative effects to water resources are the same as described in the AFC, with the exception of the ocean-water discharge.

CECP brine discharge to the ocean would range between an average of 396,000 gpd, without PAG, and a maximum of 727,200 gpd, with PAG operating 8 hours per day, as shown in Revised Figures 5.15-1 and 5.15-2 for the CECP revised average and maximum water balance. This reject stream will be discharged to the ocean. The mixed-bed demineralizers would be removed from the site by an outside provider and would therefore not generate any waste stream onsite. Wastewater from miscellaneous plant uses will be recycled to the ocean-water tank for reuse. The cumulative effects from this additional waste load would not be significant.

The CSDP, which will be located on property leased from Cabrillo Power I LLC at the EPS, will provide a new, local, drought-proof source of potable water for the region. The CSDP and the CECP are two separate projects. Similar to the proposed CECP's ocean-water purification system, the CSDP project will take ocean water from the once-through cooling system that provides cooling water to existing EPS Generating Units 1 through 5. CECP is a dry-cooled plant and does not rely upon ocean water for once-through cooling.

The CECP and CSDP are considered separate projects. Each shall obtain all required permits for construction and operation. Due to the nature of the separate projects, both projects would be required to be in compliance with regulatory authorities separate from each other. The discharge from the operation of the CECP ocean-water purification system is less concentrated and approximately 1 to 2 percent of the total volume of the CSDP discharge. Therefore, the cumulative effects for the CECP as it would relate to the CSDP would not be significant.

5.15.8 Involved Agencies and Agency Contacts

Involved agencies and agency contacts are the same as described in the AFC, with the exception of the Water Board, as shown in Revised Table 5.15-4.

REVISED TABLE 5.15-4
Agency Contacts for Water Resources

Issue	Agency	Contact
To comply with NPDES permit requirements, a Report of Waste Discharge must be filed prior to operation of the ocean water discharge.	Water Board	Water Board 9174 Sky Park Court, Suite 100 San Diego, CA. 92123-4340 (858) 467-2952

5.15.9 Permits Required and Permit Schedule

Agency contacts and required permits are the same as described in the AFC, with the exception of the Water Board, as shown in Revised Table 5.15-5.

REVISED TABLE 5.15-5
Permits and Permit Schedule for Water Resources

Permit	Agency Contact	Schedule
National Pollutant Discharge Elimination Permit	Water Board 9174 Sky Park Court, Suite 100 San Diego, CA. 92123-4340 (858) 467-2952	An application has been filed with the Water Board.

5.15.10 References

Jenkins, Scott & Wasyl. Joseph. 2008. *Hydrodynamic Analysis of Near-shore Dispersion and Dilution of Concentrated Sea Water from Closed-Cycle Cooling Systems at Encina Generating Station, Carlsbad, CA*.

5.16 Worker Health and Safety

The project enhancements and refinements will not result in potential impacts related to worker health and safety greater than those analyzed in the AFC. The worker health and safety LORS included in the AFC are also applicable for the project enhancements and refinements, and no new worker health and safety LORS apply as a result of the project enhancements and refinements.

The worker health and safety programs developed to support construction and operation of CECP will also be applicable and address worker health and safety during construction and operation of the project enhancements and refinements. The proposed Conditions of Certification for worker health and safety during construction and operations for CECP are also applicable for the project enhancements and refinements.

As a result of the construction and operation CECP and the project enhancements and refinements being in compliance with all applicable LORS and with implementation of the proposed Conditions of Certification, any potential issues associated with worker health and safety will be less than significant.